



Trelowarren Double Lodges, near Helston, Cornwall Historic building survey and assessments



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The CAU Project Manager was Nigel Thomas.

The views and recommendations expressed in this report are those of Cornwall Archaeological Unit and are presented in good faith on the basis of professional judgement and on information currently available.

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Cover illustration:

Double Lodges entrance looking east (taken in December 2014)

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Abbreviations

CAU	Cornwall Archaeological Unit
CRO	Cornwall Record Office
EH	English Heritage
EHA	English Heritage Archive (formerly the National Monument Record)
HER	Cornwall and the Isles of Scilly Historic Environment Record
MCO	Monument number in Cornwall HER
NGR	National Grid Reference
OD	Ordnance Datum – height above mean sea level at Newlyn
OS	Ordnance Survey
RIC	Royal Institution of Cornwall

1 Summary

PDP Green Consulting Ltd were commissioned by Sir Ferrers Vyvyan to undertake assessments and surveys leading to the restoration of the Grade II listed Double Lodges at the south entrance of the Trelowarren Estate near Helston. The Double Lodges complex, constructed in the mid-18th century, is located at NGR SW 71715 22697 (Figs 1 and 2). Whilst PDP Green undertook the structural survey, Cornwall Archaeological Unit was subcontracted to carry out an historic building survey and assessment and Cornwall Environmental Consulting Ltd was subcontracted to carry out a bat survey. The works were undertaken in advance of proposed repair and consolidation to stabilise and protect the structures, as part of a Higher Level Stewardship agreement entered into by Sir Ferrers Vyvyan with Natural England.

The Double Lodges complex is designed to be perfectly symmetrical and lies at the southern entrance to the Trelowarren Estate. It includes two octagonal lodge buildings (the north-west lodge designed as a kitchen/living room and the south-east lodge designed as a bed chamber), adjoining flanking walls forming a semi-circle which terminates with piers at the roadside and three (formerly four) gate piers located between the two lodges. The entrance forms part of a major remodelling of the house and pleasure grounds undertaken by Sir Richard Vyvyan in the 1750s. The gate piers are likely to be replacements, erected here in c1833 (possibly having been salvaged from Nanswhydden House after it burnt down).

By the mid-20th century the north-western free-standing gate pier had been removed along with former wrought iron gates. Since the 1950s when the last resident left the lodges, they have been left vacant. The roof coverings were replaced during the 1980s using Spanish slate and grey ridge tiles. At that time the roof structures were also replaced, along with the brick chimneys. All the replacement work carried out in the 1980s was designed to match the original features and replace like with like. The windows and doors of the lodges have now been removed and the window openings blocked with concrete blockwork.

Significantly the Double Lodges with associated flanking walls and gate piers are Grade II listed structures and are also included as part of the Grade II registered park and garden. The lodges and flanking walls have remained essentially as they were first built in the 18th century and exist as a fine example of mid-18th century architecture. The symmetrical design of the entrance, its surrounding landscape features and associated buildings are important survivors of the 18th century remodelling of the grounds at Trelowarren. The complex as a whole can be classed as having high heritage significance.

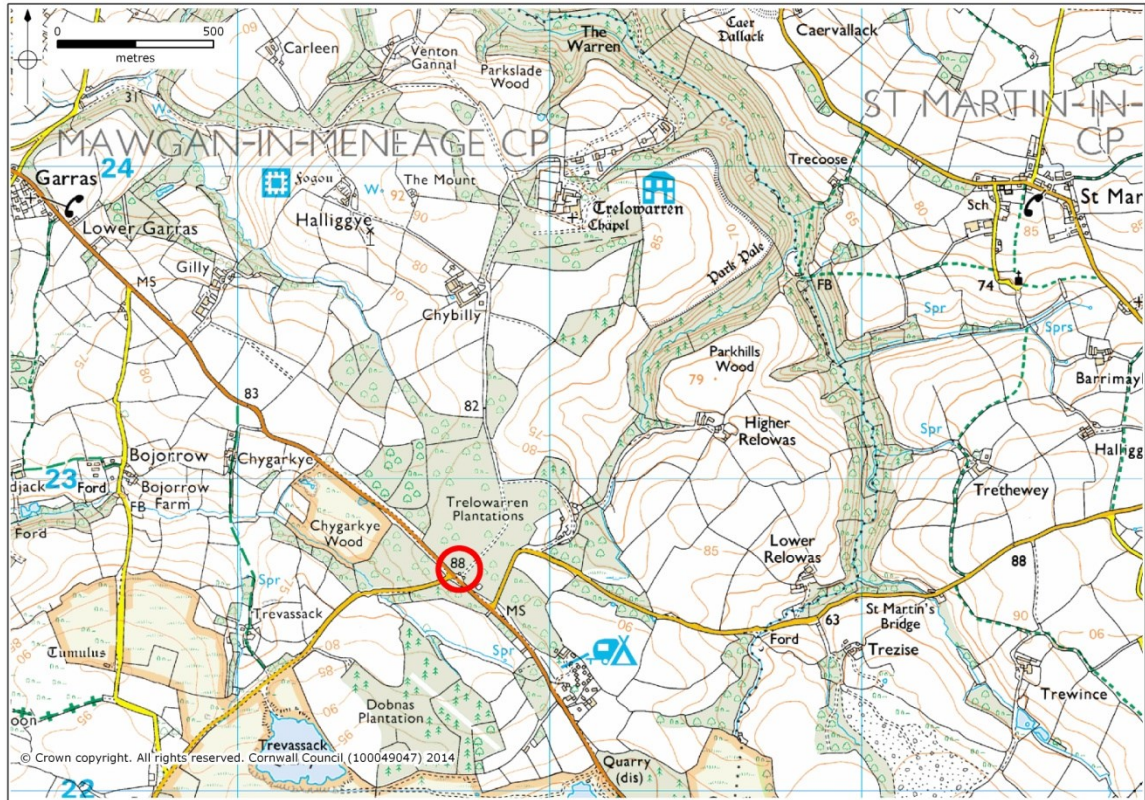


Fig 1 Location map.



Fig 2 Aerial view 2005.

2 Introduction

2.1 Project background

Sir Ferrers Vyvyan has entered the Trelowarren Estate into a ten year Entry/Higher Level Stewardship agreement with Natural England (ref AG00360113). As part of this agreement plans were made to undertake assessments and surveys leading to the restoration of the double lodges and their associated features (Reynolds 2014). A brief outlining the required works was prepared by Ann Reynolds, Senior Archaeologist, Countryside Advice, Historic Environment, Cornwall Council. This brief sets out the entire works schedule and includes requirements for historic assessment, an historic building survey, a bat survey, a structural condition survey, an assessment of significance and options appraisal. PDP Green Consulting Ltd were commissioned to manage and carry out key elements of the project, subcontracting Cornwall Archaeological Unit to undertake the historic assessment and building survey and Cornwall Environmental Consulting Ltd to complete the bat survey.

2.2 Aims

The project as a whole aims to put in place all work and consents needed to restore the lodges and associated entrance features.

Specific aims were to undertake an archaeological and structural survey of the Double Lodge complex in order to provide the level of information required to understand its construction, significance and most appropriate restoration, to ensure that its historical integrity is preserved and enhanced (Reynolds 2014).

The final aim was to use the information gathered to support plans for restoration by drawing up works specifications and applying for Statutory Consents (Reynolds 2014).

3 Location and setting

Trelowarren House is located at NGR SW 72078 23841 and is a Grade I Listed Building set within a Grade II Registered Park and Garden. It is located approximately 9km south-east of Helston on the Lizard peninsula (Fig 1). The Double Lodges including their flanking walls and gateposts at the south entrance of the estate (NGR SW 71715 22697) are grade II listed structures. This entrance fronts the B3293, a busy road leading from Helston to St Keverne, and is situated on a flat area of ground which lies at a height of approximately 88m OD. Beyond the entrance, the drive leads north-east and north through the Trelowarren Plantations; these plantations of silver fir, Pinaster, and Scots pine were planted on Lizard Heath as experimental forestry in c1755 (Register of Historic Parks and Gardens). The south drive was the principal access to Trelowarren in the 18th century. The soils here are recorded as Denbigh 2 loam over shale, overlying bedrock of the Roseland Breccia Formation (British Geological Survey).

4 Designations

The Double Lodges, flanking walls and gate piers are all grade II listed structures (Listed Building No. 65341.)

The listed building description is as follows:

Entrance lodges, gate piers and screen walls to Trelowarren House qv, circa early C19. Lodges are stucco over serpentine rubble with octagonal roofs behind parapets, the left hand lodge with the original scantle slate, the right hand lodge, asbestos slate. Brick chimneys over the walls opposite the entrance. Granite ashlar flanking walls and piers. 2 octagonal plan lodges; each of one room plan, the left hand one the living room with larger fireplace; the right hand one the sleeping chamber. The lodges flank the gateway at the entrance to the carriageway, one principal pier remaining. To left and right are low quadrant-on-plan walls with terminal piers. The single storey octagonal lodges have stone

coped parapets; the 3 outer faces of each lodge have central round-headed blind or blocked openings, the inner ones doorways. At the rear are similar openings with doorways near the gateway; the left hand lodge has an old 2-light casement surviving in the bay next to the doorway. Between the 2 lodges, flanking the gateway, the remaining of 2-gate piers is rusticated granite ashlar with moulded cornice and cap, square-on-plan, and smaller half piers attached to the lodges are similar. Flanking the outer side of the lodges are low square-coped screen walls ramped at either end with square-on-plan terminal gate piers, at left and right, with square cap stones.

It should be noted that the early 19th century date given in the listing description is incorrect. The main structural elements are mid-18th century in date although the gate piers between the two lodges are probably an early 19th century insertion.

The grounds surrounding Trelowarren and including the site of the Double Lodges are part of a Grade II registered park and garden (No. 2321). The grounds are listed as 'mid-18th and early 19th century gardens and parkland, with earlier origins' (full listing description held by EHA).

The whole of Trelowarren lies within an area designated as both an Area of Outstanding Natural Beauty (AONB) and an Area of Great Scientific Value (AGSV).

5 Methods for historic building survey and assessment

The fieldwork was undertaken to be equivalent to an English Heritage Level 2/3 survey (see English Heritage 2006). It comprised a walk-over, photographic survey, measured survey and the production of brief building descriptions.

5.1 Desk-based assessment

During the desk-based assessment historical databases and archives were consulted in order to obtain information about the history of the double lodges' entrance. The main sources consulted were as follows:

- Cornwall HER
- Early maps and photographs (see Section 13.1)
- Published histories (see Section 13.2)
- Internet (see Section 13.3)

5.2 Fieldwork

Analysis of the building fabric was undertaken on site (recorded as notes). A total station survey was also undertaken to create a topographical plan and elevations of the lodge flanking walls. External measured elevations of the lodges themselves were created by hand.

The photographic record comprised:

- general views
- internal and external elevations
- examples of structural and architectural detail

The principal photographic record comprised black and white photographs taken using a 35mm camera on fine grain archive quality film. Supporting colour photographs were taken with a digital camera for illustrative use.

A metric scale was included in all archive shots where possible.

5.3 Post-fieldwork

All project materials were prepared for long term storage. This report was prepared to summarise the results of this stage of the works.

6 History of the site

Trelowarren was part of King Harold's possessions before his death at the battle of Hastings in 1066 and it is listed in the Domesday Survey of 1086 as *Trellewaret* held by Thurstan (Thorn and Thorn 1979). The place-name consists of the Cornish element *tre* plus an unknown element; the early spellings and stress show that the second word cannot be *lowarn* 'fox', but the name may later have been felt to contain that word (Padel 1985, 168).

In 1227 Trelowarren was held by Robert Cardinan and it passed to the Ferrers family two generations later by the marriage of Isolda Cardinan to Sir William Ferrers. Their descendent, Richard Ferrers held the manor in 1426, when there was a small manor house here, and it was his daughter Honor who brought Trelowarren into the Vyvyan family by marrying John Vyvyan (Country Life, 1916; Vyvyan 1976, 5).

Little is known about the extent and layout of the original medieval house at Trelowarren although it seems likely that it was located either wholly or partially on the site of the present house with its main entrance on the eastern side. References to a medieval chapel dedicated to St Mary on the site in the 15th century suggest that it lay to the north of the present house (Henderson, 1958, 335).

The first available map to show any detail of the Estate is Thomas Martyn's map of the county of Cornwall dated 1748 (Fig 3). This shows that a driveway from the south to the house already existed by this date. It is unclear, however, whether the southern end of this driveway followed the line of the present route leading to the later Double Lodges or if it led directly southwards to join the bend in the road which leads to Newtown-in-St Martin.

During the 18th century Sir Richard Vyvyan, the fifth Baronet (1732-1781), who had been a student of the antiquarian William Borlase, employed the architect Thomas Edwards of Greenwich to remodel the house in Georgian fashion as well as employing Dionysus Williams to redesign the grounds (Register of Parks and Gardens, 2000, 70). Gilbert (1820), states that the fifth Baronet, reconstructed the interior of the house in the 1750s. It seems almost certain that Dionysus Williams and possibly Thomas Edwards were involved with the design of the Double Lodges and new south entrance to the estate in the 1750s as the complex is clearly shown on what is thought to be Dionysus Williams's Plan of the Barton of Trelowarren c1750 (Fig 4). At this date the south entrance and drive became the principal access for the house.

The list entry for the Register of Historic Parks and Gardens states that the Grade II* gate piers which now stand approximately 150m to the west of the house date to the 1660s. These piers are said to have been moved from their original site (at the entrance to the 17th century forecourt on the west side of the house) to the site of the Double Lodges as part of the newly created south entrance in c1760 (Vyvyan 1901-1903). It is likely that the piers were moved to their present position at the entrance to the drive to the west of the house when this was created by Sir Richard Rawlinson Vyvyan in c1833, and that at the same time the present gate piers (possibly salvaged from Nanswhydden) were erected at the double lodges entrance.

The next available cartographic source which shows the southern entrance is the c1840 Tithe map for the parish of Mawgan-in-Meneage (Fig 5). Comparison with the Dionysus Williams plan (Fig 4) clearly shows that the Tithe map depiction of the entrance and flanking lodges is inaccurate.

The entrance is shown much more accurately on the First Edition OS map of c1880 (Fig 6). This map indicates that by this time a lean-to had been added to the north-west side of the north-west lodge and a private enclosed garden had been established in the

plantation to the south-east of the entrance and was connected to the lodges via a footpath. Another footpath leading north from the north-west lodge led to two small rectangular buildings located approximately 30m away. Both survive but are now roofless and one contains a fireplace. These buildings may be contemporary with the lodges.

Between c1880 and c1907 (see Figs 6 and 7) the entrance area appears to have remained relatively unchanged. Photographs (Figs 8 and 9) dating to the early 20th century show the lodges with one window opening each fronting the road. The windows themselves are shown at this date as casements with small octagonal panes. At this date both freestanding gate piers remained intact with urns surviving on top. The wrought iron gates to the carriage entrance and both pedestrian entrances also survived along with arched, wrought iron bars over them on which lanterns were once suspended and estate fencing around the splayed roadside entrance.

By the mid-20th century (as evidenced by a photograph of this date, Fig 10), the north-western freestanding gate pier had been removed along with the wrought iron gates, the arched iron bars over and the estate fencing. The windows in the lodges had also been replaced with simple casements containing rectangular panes. All three historic photographs show a backdrop of dense woodland to the rear of the lodges inside the estate.

Since the 1950s when the last resident left, the lodges have been left vacant. The listed building description of 1957 describes an original scantle slate roof covering on the north-west lodge and asbestos slate covering on the south-east lodge, but these roof coverings were replaced during the 1980s using Spanish slate and grey ridge tiles. At that time the roof structures were also replaced, along with the brickwork chimney on each lodge. All the replacement work carried out in the 1980s was designed to match the original features and replace like with like.

The windows and doors of the lodges have now been removed and the window openings infilled with concrete blockwork.

7 Results of historical assessment and building survey

The Double Lodges complex forms the southern entrance to the Estate and comprises a symmetrical arrangement of structures fronting the B3293. The structures include two lodges (the north-west lodge designed as a kitchen/living room and the south-east lodge designed as a bed chamber), adjoining flanking walls forming a semi-circle which terminates with piers at the roadside. Three (formerly four) gate piers located between the two lodges.

Other features which are associated with the complex but which will remain unaffected by the proposed works are discussed as follows:

In front of the curved flanking walls along the roadside and either side of the entrance are two elliptical-shaped grassed areas measuring approximately 8m in width which were once enclosed with iron park fencing (see Figs 8 and 9). Immediately to the rear of the lodges and flanking walls, inside the Estate, are a further two grassed areas each measuring approximately 20m² either side of the drive surrounded by shrubs and trees. Within the north-west area there is a slate covered well which lies approximately 8m to the north of the lodge. Beyond this at 27m to the north of the lodge and just outside the grassed area, lie two small, roofless, serpentine rubble buildings which are likely to be contemporary with the lodges. The larger of the two building measures 4m² and was either used as a bedchamber, shelter or office since it has a small fireplace in the west gable and the smaller building measuring 2m by 3m was almost certainly a privy. Another feature associated with the complex is sub-rectangular enclosure (presumed to be a private garden for the Double Lodges) shown on the c1880 and c1907 OS maps (Figs 6 and 7). This garden enclosure still survives in the form of a low bank within the woodland. It measures approximately 20m north-east to south-west by 16m north-

west to south-east and lies approximately 50m to the south-east of the south-eastern lodge. It is shown on the historic OS maps with a footpath leading directly to it from the lodges.

7.1 The Lodges

The lodges are mid-18th century in date and stand approximately 7.5m apart either side of the once gated entrance to the estate. They are small single-room, octagonal buildings, built as mirror images of each other. Each measures 5.9m in external diameter with external wall lengths of 2.4m and wall heights of 3.4m. The walls are constructed from roughly coursed serpentine rubble bonded with a mid-yellowish brown silty clay, earth mortar whilst the arches over openings and recesses are constructed from brickwork. Each lodge has a stepped-out granite plinth at its base and a granite parapet coping at the top. The external serpentine rubble wall faces have large patches of white painted render surviving. The original render comprises the same earth mortar that has been used for bonding the masonry and its surface is incised to give the illusion of ashlar masonry to match the granite ashlar flanking walls. Much of the original render survives although some areas have been patched with modern cement mortar and incised lines added to match the original.

Both lodges have the same external arrangement of window and door openings repeated as mirror images of each other. Both have a single door opening fronting the carriageway to the rear of the former gates, a single window opening facing north-east into the estate and a single window opening facing south-west onto the road. Either side of the south-west windows there are blind doorways fronting the roadside which originally may have contained illustrative paintings (although the plasterwork within the recesses is scribed to imitate ashlar) Unfortunately no original joinery survives and all openings are now blocked or boarded over.

Both buildings have octagonal pyramidal roof structures which were replaced like-for-like in the 1980s when they were re-slatted with Spanish slate. Each of the buildings has a brick-built chimney, which were also like-for-like replacements built in the 1980s.

7.1.1 North-west lodge

The north-west lodge was designed to function as a kitchen and living room. Externally there are no differences in the external design of the two lodges except that they are mirror images of each other. However, internally each lodge is designed for different functions. The interior stone wall faces of the north-west lodge were originally plastered and some patches survive although much of what is left is a replacement cement render. In the north-west wall there is a large serpentine rubble-built chimney breast with a large fireplace designed to take a cooking range. The fireplace has a replacement, quarried granite lintel and a slate hearth (Fig 20). Either side of the chimney breast there is evidence for former cupboards along the north and west walls. There is also a recess in the south wall behind the blind doorway which would have provided more cupboard space. The front window opening in the south-west wall shows evidence for a former window seat. The floor surface in this lodge comprises a cement screed (with the exception of the slate flagstone in front of the fireplace) which may cover an earlier floor surface. Originally there would have been a suspended ceiling but this is now missing and the roof structure is now exposed.

7.1.2 South-east lodge

The south-east lodge is very different internally, being designed originally to function as a bed chamber. In this room the stone walls were originally dry-lined although this has since been removed leaving the iron brackets that once attached the dry-lining scattered over the wall surfaces. A tall stepped-out moulded skirting, created in plaster, remains *in situ*. All original fittings in the room, such as the fireplace, were designed to work with the dry-lined wall surfaces. In the south-east wall the fireplace with its cast-iron grate survives, although the mantle/surround has been removed and a raised cement-covered hearth has been inserted. As with the north-west lodge the front window opening in the south-west wall shows evidence of a former window seat and

there is also a blocked, recessed cupboard in the west wall behind the blind doorway. The floor surface in this lodge comprises a cement screed which may cover an earlier floor surface and as with the north-west lodge originally there would have been a suspended ceiling which is now missing, exposing the roof structure.

7.2 Flanking screen walls and associated piers

Two symmetrically built screen or flanking walls, one adjoining the north-west wall of the north-west lodge the other adjoining the south-east wall of the south-east lodge, arc south-westwards to join the road forming a semi-circular entrance area to the lodges. These walls are constructed from granite ashlar and have granite coping. They stand approximately 1.2m high although at the ends they rise up to a height of 2.4m where they join the lodges and the terminal piers. The joints between the ashlar blocks are very fine so that the bonding material is not visible. At the roadside end of each wall is a square-plan granite ashlar pier surmounted by a square-plan granite capstone. The width of the entrance between the two terminal piers is approximately 40m.

7.3 Gate piers

It seems likely that these gate piers were erected here in c1833 (possibly having been salvaged from Nanswhydden House after it burnt down) as replacements for the earlier c1660s gate piers which were moved in c1833 to a newly created entrance to the west of the house.

The two lodges stand 7.6m apart. Between them was once a gated entrance comprising a central carriage entrance framed by two taller piers with pedestrian entrances either side of it. The wrought iron gates were removed in the early or mid-20th century at the same time as the north-western free-standing gate pier (presumably to allow access for larger vehicles). The elements of the gateway that survive include the south-eastern free-standing gate pier and two smaller half piers that adjoin the lodge walls on either side. They are rusticated granite piers which have a strikingly different finish to the ashlar flanking walls and false ashlar render of the lodges. It is not unusual to see the two finishes used together in 18th or early 19th century architecture although in this case it seems that the piers are probably not contemporary with the original complex.

Originally the free-standing gate piers had stone urns as finials. These are now missing as are the wrought iron gates which are shown in early photographs (Figs 8 and 9). The carriage gateway would have measured 3m in width and the pedestrian gateways 1.15m in width. The remaining free-standing pier has been knocked by large vehicles and the granite capstones are now dislodged. The iron bar which once held a lantern over the south-east pedestrian gate is now broken and twisted. Some iron pintail hinges which once held the gates remain *in situ* in all three piers.

8 Results of bat survey

An assessment for bats was undertaken by Cornwall Environmental Consultants Ltd on 7th November 2014 and the assessment report is attached as an Appendix within this report.

To summarise, evidence of bats was found in the NW Lodge and the recommendations from the assessment describe that it will be necessary to maintain access to this building, in the form of a 'letterbox' arrangement with a minimum opening size of 150 x 50mm. In addition, it will be necessary to ensure bitumen felt underlay is used in roofs that will potentially be inhabited by bats.

9 Results of structural survey

A Structural Appraisal Report has been undertaken and the recommendations are included within the Design Statement. Both documents were prepared by PDP Green Consulting Ltd, and are attached as Appendices to this report.

10 Statement of significance

The Double Lodges with associated flanking walls and gate piers which stand at the south entrance to Trelowarren are Grade II listed structures. They are also included as part of the Grade II registered park and garden. With the exception of the gate piers between the two lodges, all the other structural elements were designed and built in the mid-18th century as part of a major remodelling of the house and pleasure grounds undertaken by Sir Richard Vyvyan, the fifth Baronet (1732-1781). At this time Sir Richard Vyvyan commissioned Dionysus Williams to redesign the grounds which included the creation of a grand south entrance as the principal access to the house.

The design of the entrance is completely symmetrical. The flanking walls with terminal piers are constructed from granite ashlar and the lodges themselves built from serpentine rubble with a false ashlar render to echo the flanking walls. The lodges are based on an octagonal architectural design and were probably originally constructed as lodgings for a gate keeper.

The gate piers between the two lodges are likely to have been erected in the 1830s when two reused 1660s piers were removed from here to stand at a newly-built entrance to the west of the house (Vyvyan 1901-1903 and Register of Parks and Gardens).

The lodges and flanking walls have remained essentially as they were first built in the 18th century with some alterations and repairs to the lodges such as the removal of windows, doors, ceilings and dry-lining, replacement of the roofs and rebuilding of the chimneys. The north-westernmost of the early 19th century free-standing gate piers has been removed from its original position but the granite sections have been salvaged. The wrought iron gates to the vehicle and pedestrian entrances as well as the iron rail fencing which are shown on early photographs were removed sometime during the 20th century.

The symmetrical design of the entrance, its surrounding landscape features and associated buildings are important survivors of the 18th century remodelling of the grounds at Trelowarren. These elements can be classed as having high heritage significance.

11 Discussion of issues and options

Issues and options regarding the Double Lodges complex are discussed in the Design Statement prepared by PDP Green Consulting Ltd, in support of the Listed Building Consent application. This document has included as an Appendix of this report.

12 Recommendations

Recommendations for progressing with the consolidation of the south entrance include the following:

Repair/consolidation of the flanking/screening walls: Ivy should be removed from the walls and the roots treated. Repairs should be made to areas which have been damage by vegetation growth using like for like materials.

Repair/consolidation of the lodges:

It is envisaged that at present no works are to be carried out to the interiors.

Proposed works to the exteriors include:

- re-rendering the wall faces
- replacement of two windows in each lodge
- replacement door in each lodge
- repair or replacement of both roofs

Patches of the original stucco remain *in situ* on both the lodges. It is clear that this was originally incised to create the impression of ashlar blocks. It is recommended that

replacement render should be as close to the original as possible to recreate the original colour and texture and that incised lines should be added to match the existing. It is suggested that the design of the replacement windows should copy that of the original casement windows with octagonal panes shown on an early photograph (Fig 9). There is no historic evidence to indicate the original door design but it is suggested that the replacement doors should be panelled rather than ledged and braced which seems more in keeping with the design and status of the buildings. The arched section of opening above the door could contain a light with octagonal panes to echo those in the windows.

The roof structures and slate coverings along with the chimneys were replaced in the 1980s to match the existing (Sir Ferrers Vyvyan pers. comm.). None of the original roof timbers survive which would have shown evidence for removed ceilings in both lodges. Any alterations or reconstruction should match the original in both dimensions and materials.

Consolidation of the existing gate piers and options for reinstating the removed gate pier:

The existing gate piers are most probably an early 19th century insertion. The top of the remaining, large, free-standing pier has undergone damage causing the upper stonework to become dislodged and the finial shown on an early photograph is now missing. A distorted iron bar is attached to the upper courses which may once have supported a lamp over the pedestrian gate. It is suggested that the upper courses are reinstated to their original positions and secured.

The reinstatement of the removed free-standing pier would allow the symmetry of the entrance to be restored. This would enhance the appearance and add to the historic understanding of the structures. However, a perfectly symmetrical reinstatement would create a very narrow vehicle gateway passable only by car. The large farm vehicles for which this is the only access would not be able to pass. Options which could be considered as a solution include the following:

- The reinstatement of the missing gate pier in its original position. This would mean that a new entrance for large vehicle access would have to be created elsewhere (possibly to the south-west of Trezemper Lodge off the unclassified road that leads to Newtown St Martin).
- The reinstatement of the missing gate pier in a position much closer to the north-west lodge. This would allow for large vehicle access but not renew the symmetry of the entrance.
- The reinstatement of the missing gate pier in a position closer to the north-west lodge and the dismantling and rebuilding of the remaining gate pier closer to the south-east lodge. This would allow for large vehicle access and renew the symmetry of the entrance.
- Repairing the existing gate pier and not reinstating the missing pier. This would allow for large vehicle access but would not renew the symmetry of the entrance.

Surviving iron pintail hinges in the existing piers that once supported the pedestrian and vehicle gates show differing degrees of erosion. Expansion of one pintail on the northern lodge has expanded with rust, pushing the stonework of the gate pier apart. If they are deemed to be reusable it is suggested that they remain *in situ*. If not they should be replaced like-with-like.

Reinstatement of gates and park railings:

Although none of the gates or railings survive now, early photographs (Figs 8 and 9) show their design and form. It is suggested that the design of new gates and railings attempts to recreate the early 19th century design.

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Thomas Martyn's *Map of the County of Cornwall*, 1748

Plan of the Barton of Trelowarren by Dionysus Williams c1750 (CRO: V/P/1)

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English Heritage *Register of Parks and Gardens*

English Heritage *Listed Buildings Register*

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Vyvyan, JS, 1976. *Trelowarren and the Vyvyan Family*. Trelowarren Estate

Vyvyan, VD, 1901-1903. *Handwritten family history* Trelowarren Estate

13.3 Websites

<http://www.heritagegateway.org.uk/gateway/> English Heritage's online database of Sites and Monuments Records, and Listed Buildings

14 Project archive

The CAU project number is **146435**

The project's documentary, digital, photographic and drawn archive is maintained by Cornwall Archaeological Unit, Cornwall Council, Fal Building, County Hall, Treyew Road, Truro, TR1 3AY.

English Heritage/ADS OASIS online reference: cornwall2-201456

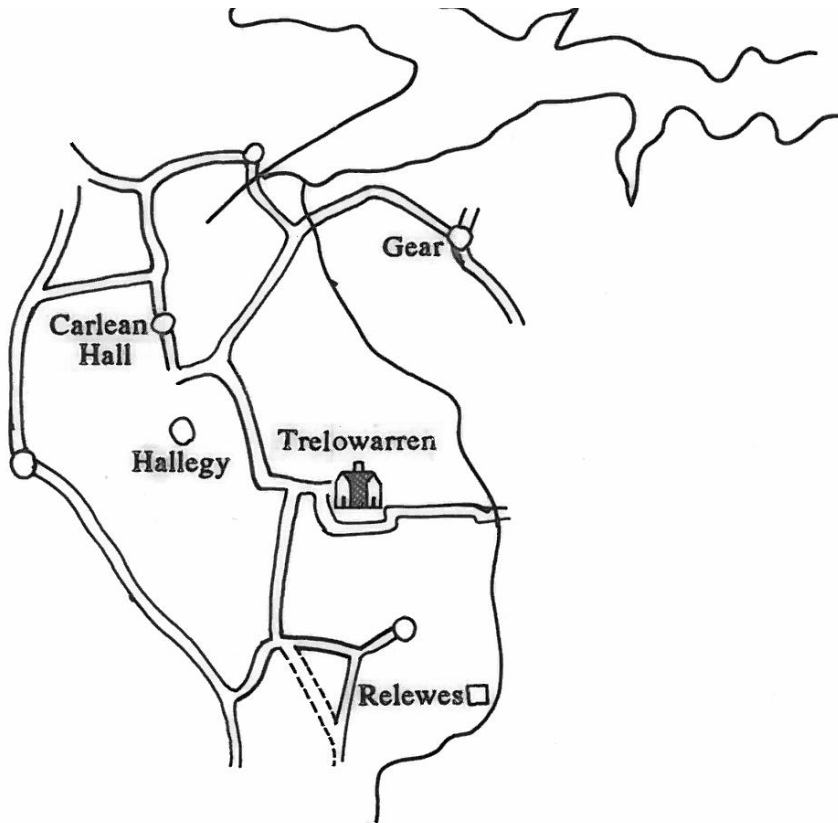


Fig 3 Tracing of Thomas Martyn's map of the county of Cornwall 1748

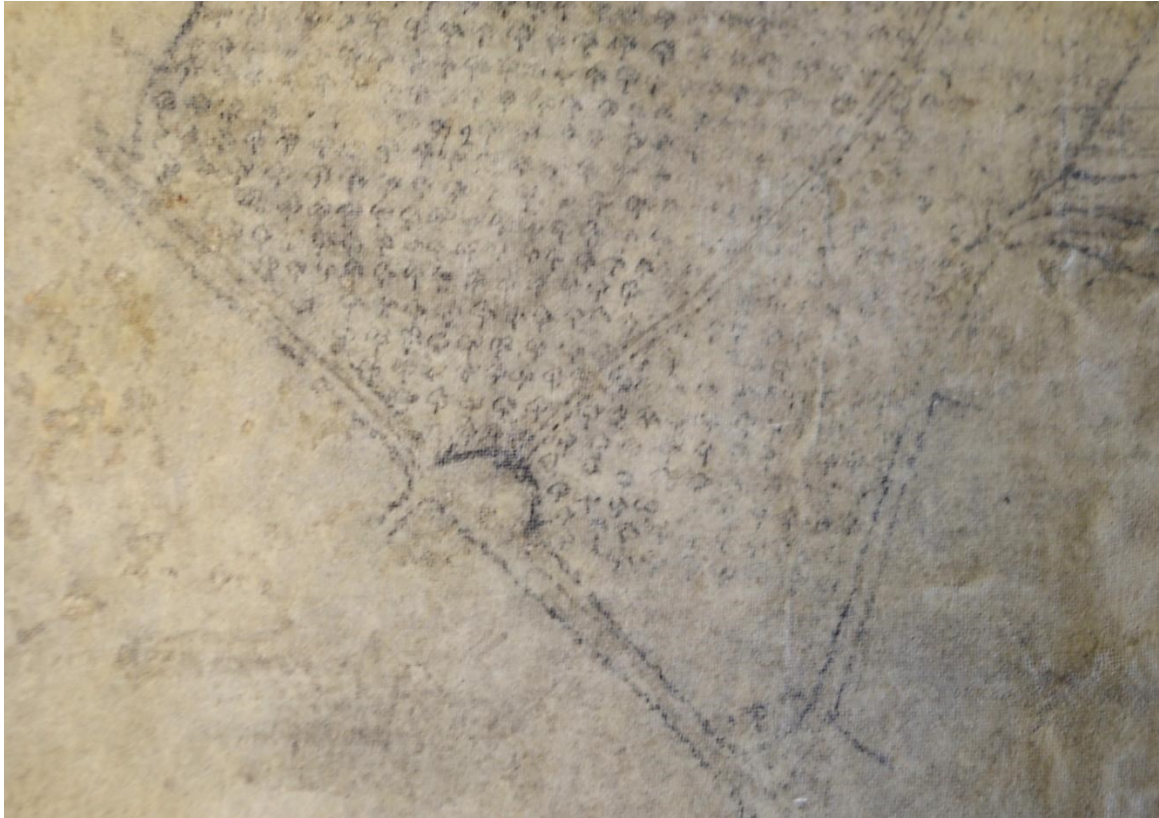


Fig 4 Extract from the Plan of the Barton of Trelowarren probably by Dionysus Williams c1750 (CRO ref: V/P/1)



Fig 5 Tithe Map for the parish of Mawgan-in-Meneage, c1840.

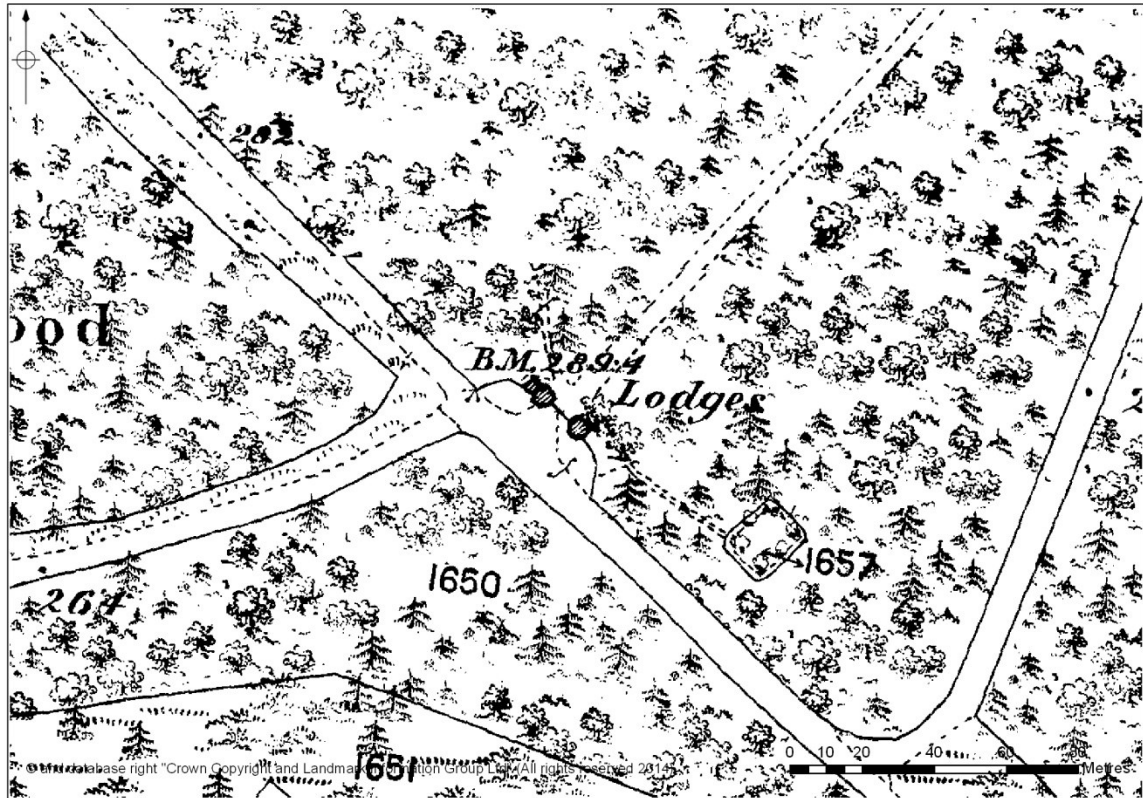


Fig 6 First Edition of the Ordnance Survey 25 Inch Map, c1880.

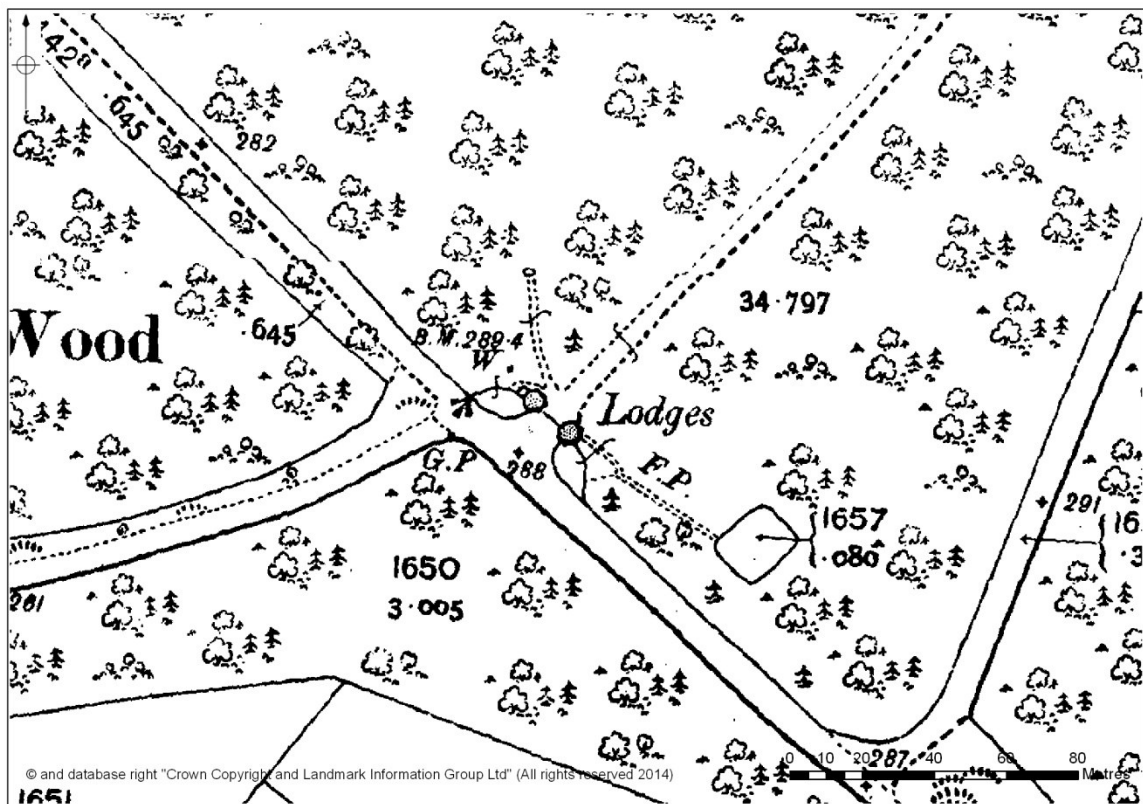


Fig 7 Second Edition of the Ordnance Survey 25 Inch Map, c1907.



Fig 8 Early 20th century photograph of the south entrance looking east

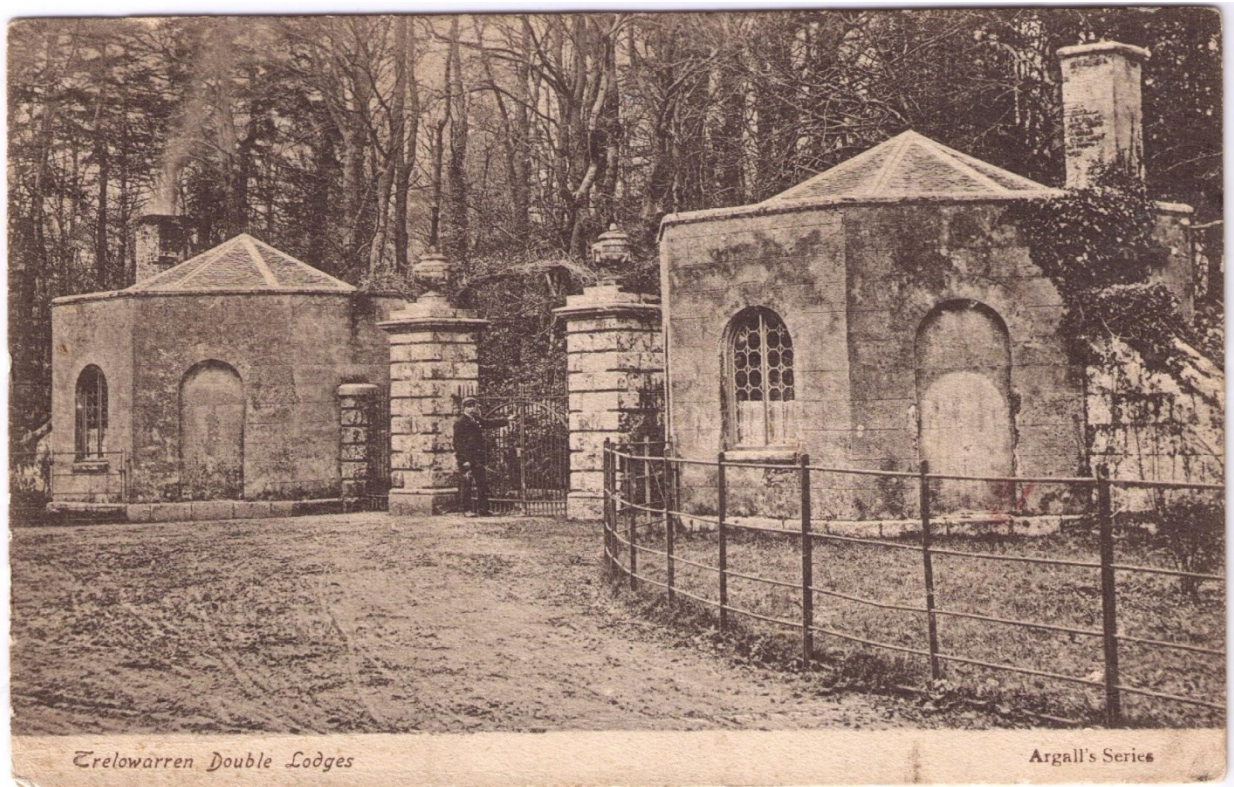


Fig 9 Postcard of the Double Lodges, c1910.



Fig 10 Mid-20th century photograph of the south entrance looking north-east

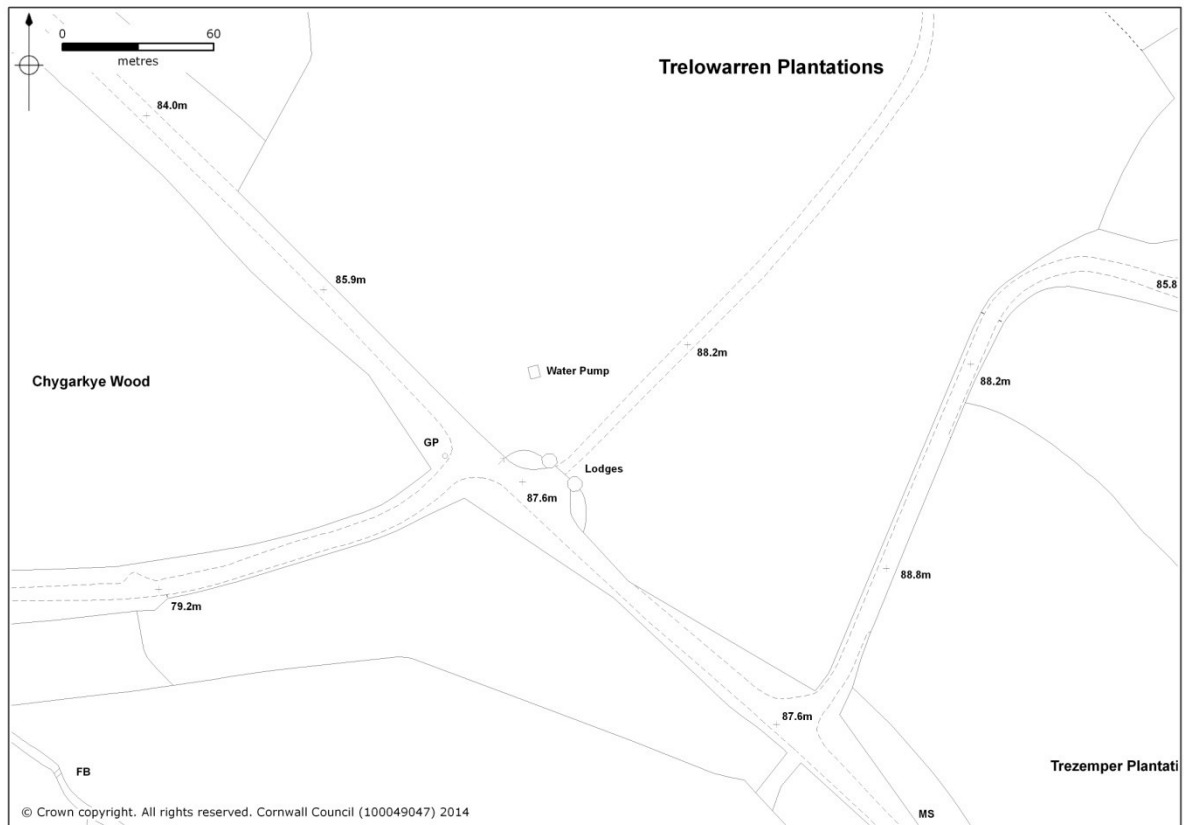


Fig 11 Ordnance Survey digital mapping showing the site and its environs (2015).



Fig 12 Lodges looking north-east from road.



Fig 16 North elevation of NW lodge.



Fig 13 Lodges looking south-west from estate.



Fig 17 West elevation of NW lodge.



Fig 14 Lodges looking south from estate.



Fig 18 South-west elevation of NW lodge.



Fig 15 East elevation of NW lodge.



Fig 19 South-east elevation of NW lodge.



Fig 20 Fireplace in north-west wall of NW lodge.



Fig 23 Door opening in east wall of NW lodge.



Fig 21 Blocked window in south-west wall of NW lodge.



Fig 24 Blocked window in north-east wall of NW lodge.



Fig 22 Cupboard behind blind doorway in south wall of NW lodge.



Fig 25 Roof structure in NW lodge.



Fig 26 North elevation of SE lodge.



Fig 27 North-west elevation of SE lodge.



Fig 28 West elevation of SE lodge.



Fig 29 North-east elevation of SE lodge.



Fig 30 Fireplace in south-east wall of SE lodge.



Fig 31 Interior of south wall of SE lodge.



Fig 32 Blocked window in north-east wall of SE lodge.



Fig 33 Interior of east wall of SE lodge.



Fig 36 Front (west) elevation of SE flanking wall.



Fig 37 Front (west) elevation of SE flanking wall and pier.



Fig 34 Front (south) elevation of NW flanking wall.



Fig 38 North-east elevation of free-standing gate pier.

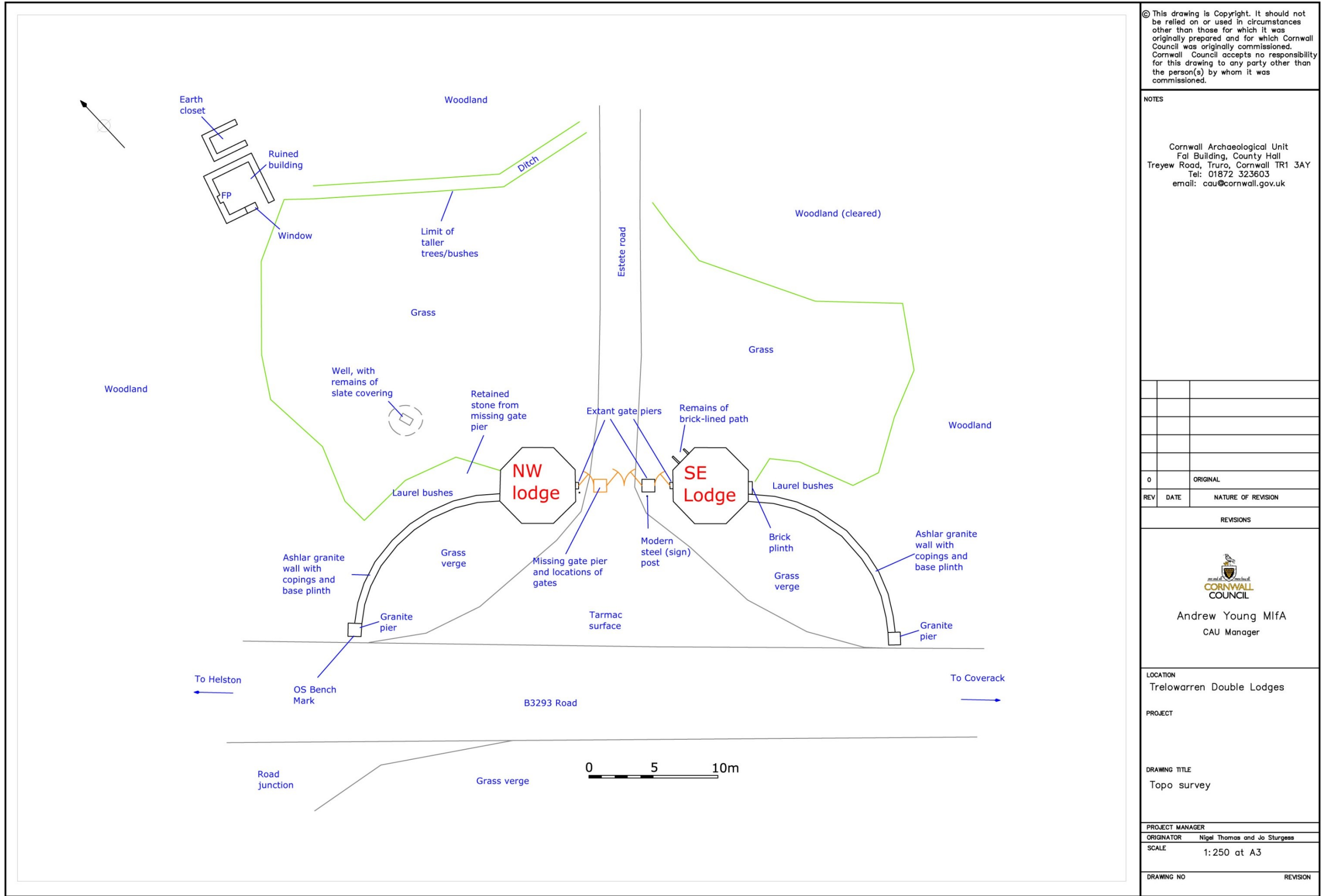


Fig 35 Front (south) elevation of NW flanking wall and pier.



Fig 39 South-west elevation of free-standing gate pier.

Note the dislodged coping stones.



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NOTES

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REV	DATE	NATURE OF REVISION
0		ORIGINAL

REVISIONS


Andrew Young MifA
CAU Manager

LOCATION
Trelowarren Double Lodges

PROJECT

DRAWING TITLE
Topo survey

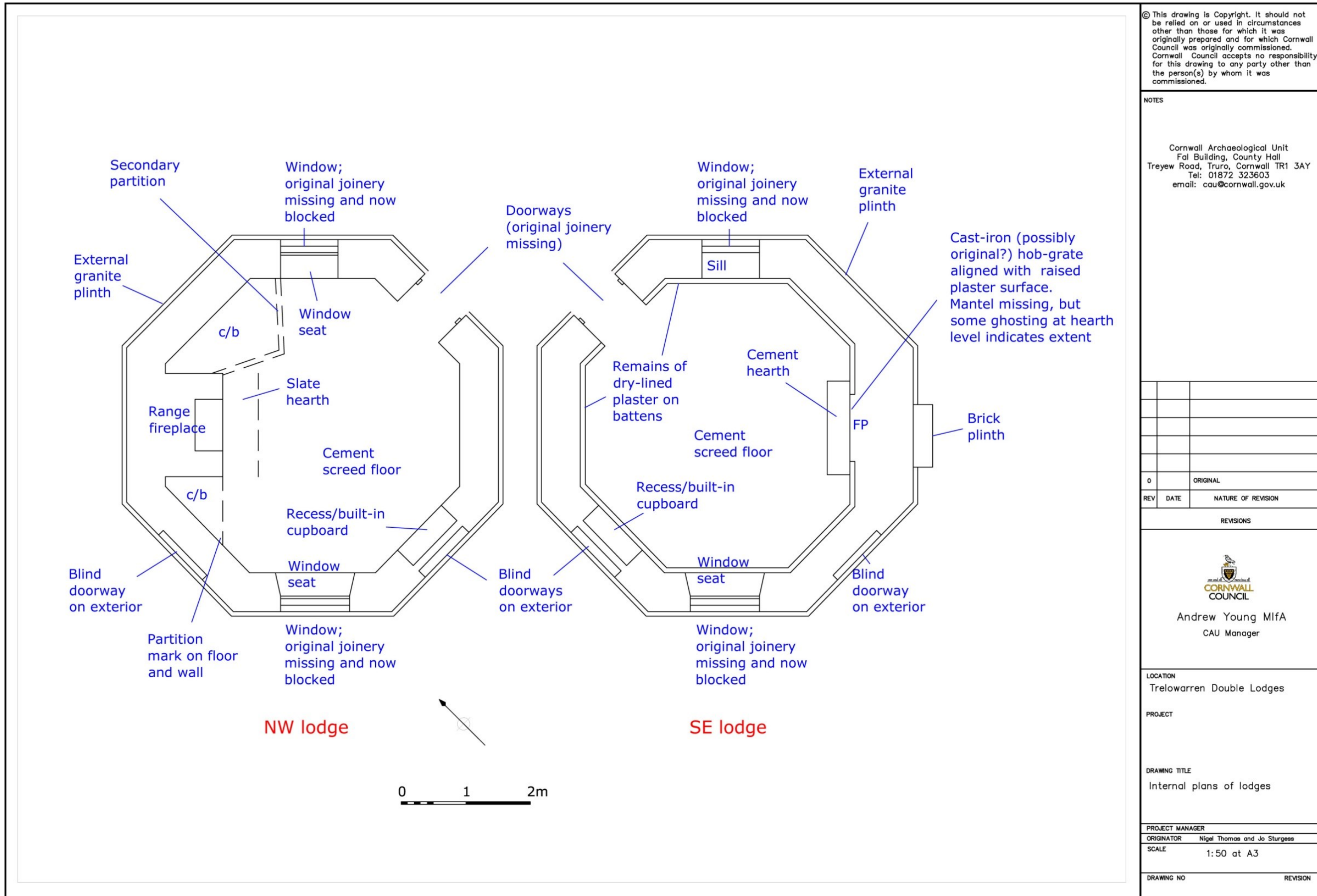
PROJECT MANAGER

ORIGINATOR Nigel Thomas and Jo Sturgess

SCALE 1:250 at A3

DRAWING NO REVISION

Fig 40 Plan of the Double Lodges complex.




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NOTES

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REV	DATE	NATURE OF REVISION
0		ORIGINAL

REVISIONS


 Cornwall Council
 Andrew Young MfA
 CAU Manager

LOCATION
 Trelowarren Double Lodges

PROJECT

DRAWING TITLE
 Internal plans of lodges

PROJECT MANAGER	
ORIGINATOR	Nigel Thomas and Jo Sturges
SCALE	1:50 at A3
DRAWING NO	REVISION

Fig 41 Lodge plans.

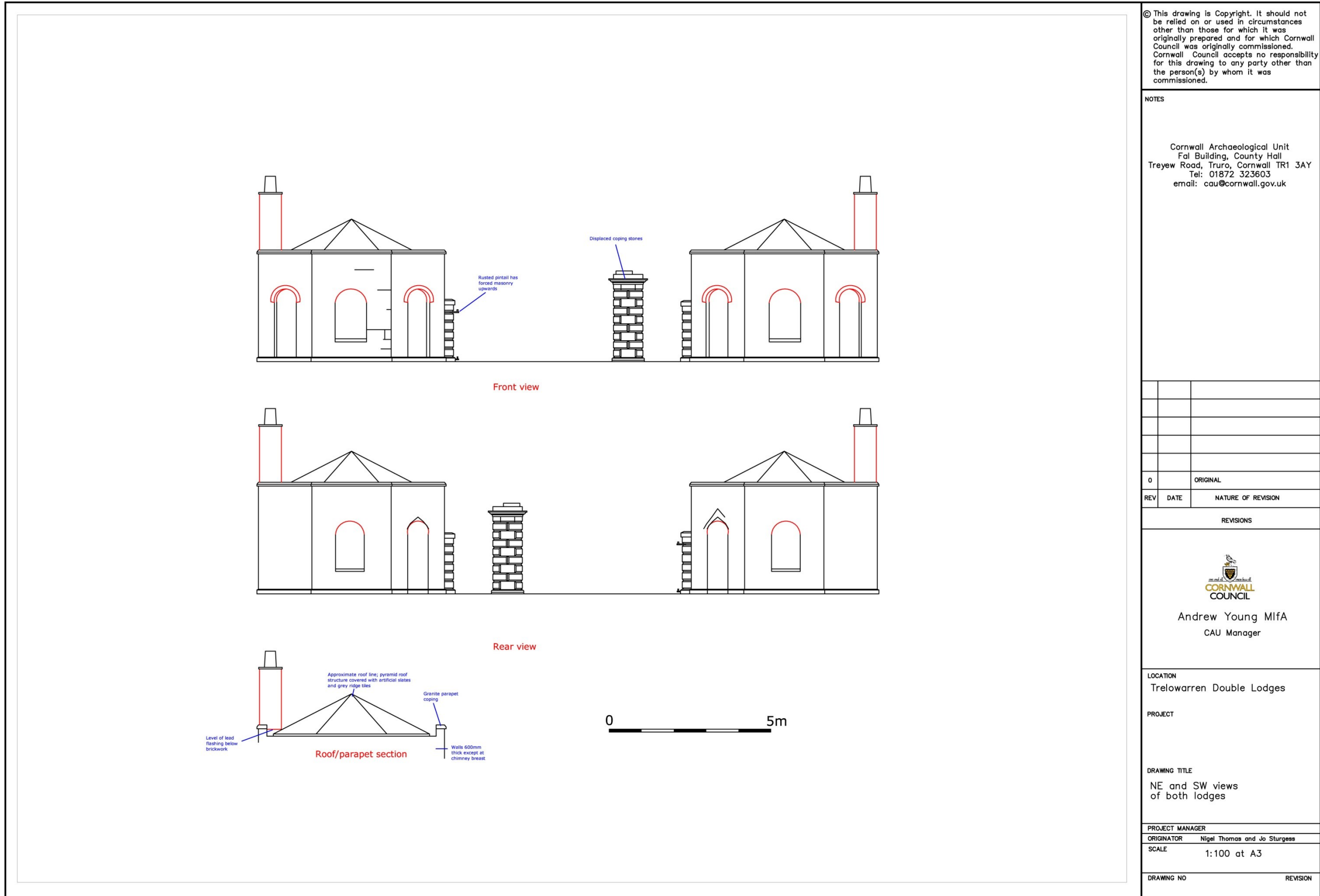


Fig 42 North-east and south-west views of both lodges.

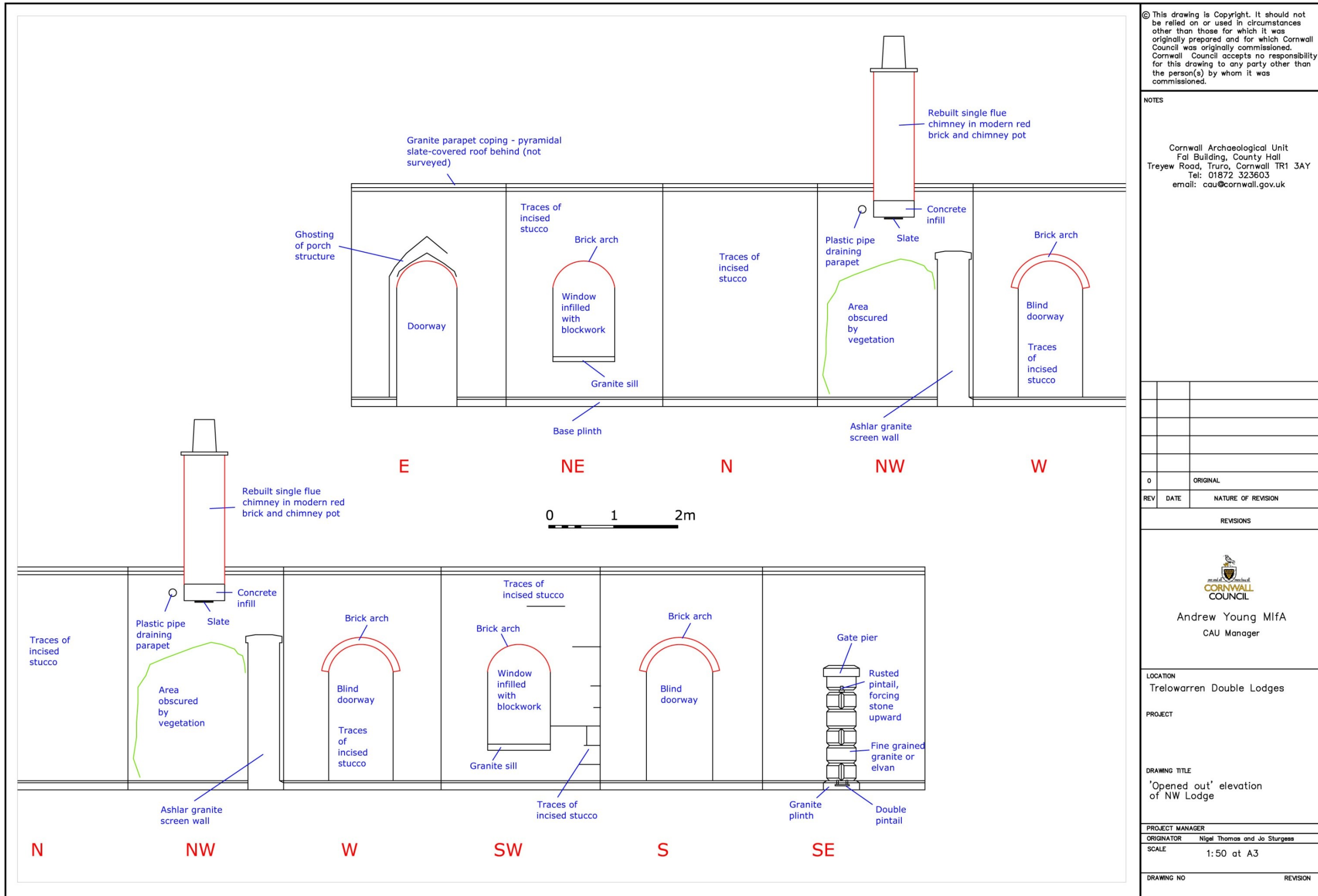


Fig 43 'Opened out' elevations of the north-west lodge.

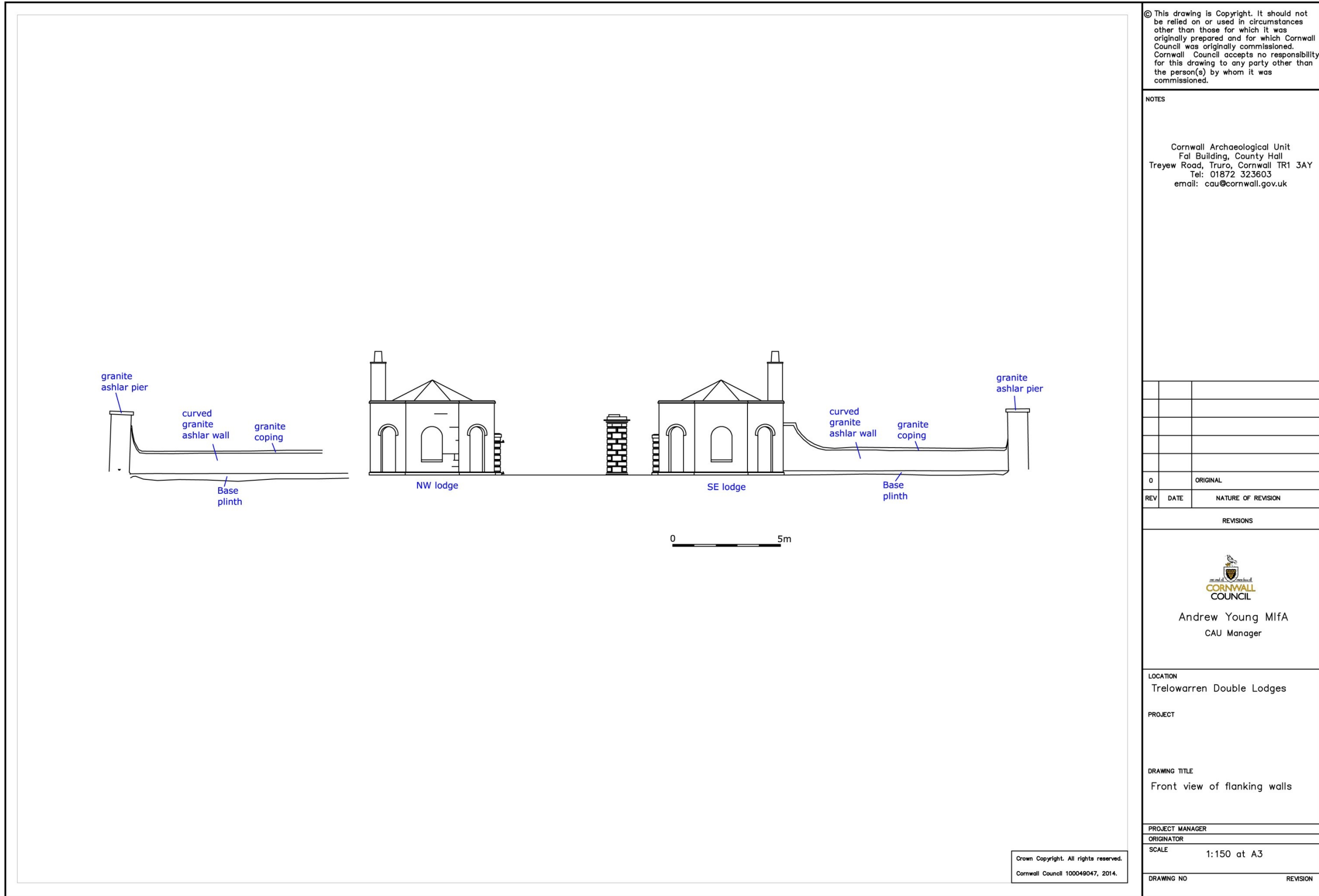


Fig 44 Front (south-west) view of the lodges and flanking walls.

Appendix 1: Bat assessment



BAT ASSESSMENT

Double Lodges

Trelowarren

Near Helston

Cornwall



cornwall environmental consultants ltd

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1. ADMINISTRATION DETAILS

Property Assessed	Double Lodges Complex Trelowarren Near Helston Cornwall	
Grid Reference	SW 7171 2269	
Name & Address of Contact	pdp Green Consulting Ltd Unit 3 Calenick House Truro Technology Park Heron Way Newham Truro TR1 2XN	
Tel	01872 265400	
Name & Address for Invoice payment	As above	
Planning Authority Involved	Cornwall Council West 2	
Planning Reference Number	N/A	
Consultancy Reference Number	CEC2520	
Date of assessment request	24/10/2014	
Date of assessment	07/11/2014	
Weather on date of assessment	Overcast with heavy rain showers. Temperature 11°	
Surveyor's name & Licence Numbers	Steve Marshall	Natural England Registration number: CLS02773 (level 2)
Report Reviewed by	Jenny Stuart	
Proposed work: <i>Demolition / Conversion / Restoration</i>	It is proposed to restore the external aspects of these two Grade II listed buildings	

2. SUMMARY OF RESULTS & RECOMMENDATIONS

Evidence of bats found	Old evidence of use by long-eared bats within the northern lodge
Bat survey recommendations	Ensure that there is access into the building for night roosting bats



3. LEGISLATION

3.1 Bats

All British bats are European protected species (EPS), included on Annex IV(a) of the European Communities Habitats Directive. Annex IV(a) species are protected in this country under Schedule 2 of the Conservation of Habitats and Species Regulations 2010. Additionally bat species in the UK are fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 and Schedule 12 of the Countryside Rights of Way Act 2000. In combination this makes it an offence to:

- Deliberately kill, injure or capture bats;
- Intentionally or recklessly disturb a bat in its roost, or deliberately disturb a group of bats;
- Intentionally or recklessly damage, destroy or obstruct access to a bat roost (a bat roost is interpreted as any structure or place which is used for shelter or protection, regardless of whether bats are present at the time or not);
- Possess or transport a bat or any part of a bat, unless acquired legally; and
- Sell, barter or exchange bats or parts of bats.

The bat ecologist will assess the significance of the bat roost and the scale of impact. Works involving significant disturbance or roost destruction (including changes to the roost) may require an EPS licence before the work can lawfully commence. Natural England is the licensing authority in England. Works involving minor disturbance may be carried out under a mitigation statement to ensure an offence is not committed. Only a suitably licensed and experienced ecologist can act as the named ecologist in the licence application, or prepare and implement a mitigation statement. Our company can provide a quotation for this additional work. The development must take into account the presence of bats and retain access and a suitable roosting site for bats.

For further information and advice contact Natural England on 0845 601 4523 (local rate).

3.2 Planning Authority

If further bat surveys are recommended to enable suitable mitigation to be designed, the Local Planning Authority will not be in a position to make a decision on the planning application until the surveys have been completed and appropriate mitigation included within the proposals.



4. ASSESSMENT INFORMATION

4.1 Description of habitat surrounding the building/s

The lodges assessed are located within a few metres of the B3293 Helston to St Keverne road. The lodges form part of the Trelowarren Estate and are immediately surrounded by mixed woodland which leads out to cattle and sheep grazed pasture and Goonhilly Downs which comprises moorland habitats. These habitats will provide good foraging and roosting opportunities for bats in the surrounding area.

4.2 Assessment methodology

An assessment as to the suitability of the building and surrounding habitat for bats and barn owls was made. The building was surveyed using a high powered lamp to illuminate all areas thought suitable for roosting bats and barn owls. This included searching for bats and barn owls *in situ*, droppings, pellets, staining, liming, feathers and feeding remains. Any cracks and crevices thought suitable for use by bats were inspected using an endoscope. The floor spaces, walls, lintels and timbers were checked. A search around the perimeter of the building was then conducted and any gaps and crevices which had the potential for roosting bats checked.

5. BAT ASSESSMENT RESULTS

5.1 Summary of results

Number seen at time of visit	None
Droppings?	Very small number within northern lodge
Any known history of colony?	No known history of a colony within the buildings assessed.
Other evidence found	Large accumulations of moth and butterfly wings within the northern lodge.

5.2 Detailed bat assessment results and recommendations

The two octagonal entrance lodges are constructed from local stone and covered with bitumen felt and slate. The roofs of both lodges have failed and timbers have suffered from the ingress of water damage and/or dry rot. The windows and doors of the lodges have been boarded to prevent unauthorised access, the doors of the two lodges were opened to allow an inspection of the interior.

1. The southern lodge appears to have suffered the most damage and the roof timbers are almost all saturated to the extent that the roofing felt had become brittle and easily crumbles. Although the roof was extremely wet and offered little opportunities for use by bats there were areas suitable for use by bats, such as gaps behind plaster and the chimney flue leading into a brick built chimney. A careful and thorough search of all areas within the lodge was undertaken; no evidence of use by bats was noted within this lodge at the time of this assessment.

2. The northern lodge is in a similar state of repair as the southern lodge but also has a small hole within the roof where several slates have slipped or been removed. The interior of the building also has an open fire place with chimney flue leading onto a brick built chimney, which were inspected using an endoscope and torch. The tops of walls within this lodge also provide a relatively dry, dark feature which offers some potential for use by bats. No evidence of use was found within these features. Within one of the boarded windows, a large number of old moth and butterfly wings, together with droppings (<5) from use by long-eared bats, was found close to the window ledge. The evidence found suggests that long-eared bats have in the past gained access into the building and utilised the interior as a night/feeding roost. The missing roofing slates may continue to offer entry into the building but the number of droppings found and old moth/butterfly wings suggests that this is not the case.

As evidence of bats has been found within the northern lodge access will need to be provided as part of any planned works to the building, and should take the form of a 'letter box' type with a minimum of 150mm x 50mm gap.



Although no current evidence of roosting bats was found within the southern lodge it cannot be assumed that bats are not present when works commence. Care should therefore be taken during the work as bats could roost unseen deep within crevices in the structure, particularly under ridge tiles, beneath wall plates, or between or above lintels. If any bats are discovered during the work they must not be handled: works must stop immediately and advice sought from CEC (tel 01872 245510).

If you wish to promote wildlife it is possible to provide roosting opportunities for bats within the completed building. Access for bats can be provided into the roof space (or into the space beneath the roofing slates if the development is to have vaulted ceilings) by leaving small gaps 15-20mm wide by at least 50mm long in suitable places. Suitable places would include behind soffits, fascias and barge boards or at the gable apex. The access points would need to be next to the walls (to allow bats to land on the wall then crawl up through the access point) and not inadvertently blocked by insulation (see enclosed leaflet for additional information).

If the roof covering is to be underlined it is recommended that bitumen roofing felt is used. Recent research has shown that the modern breathable membranes can be harmful to bats (bats have been found dead in some roosts after having become entangled in the fibres of the membrane) and the membrane deteriorates over time due to damage from bats. Only type 1F bitumen felt is suitable for use in bat roosts; if the product states non-woven, polypropylene or spun-bond it is not suitable.



Figure 1. Southern Lodge



Figure 2. Northern Lodge

Appendix 2: Structural appraisal report

December
2014



Visual Structural Appraisal

Double Lodges Complex,
Trelowarren.



pdp Green Consulting



Double Lodges Complex, Trelowarren
VSA November 2014

pdp Green Consulting



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Prepared for:

Sir Ferrers Vyvyan

Written By:

Mark Gendall – Senior Engineer.

Revision	Author/Revision Detail	Verified by	Date
Original	M. Gendall	M Terrell	27/05/15

Double Lodges Complex, Trelowarren
VSA November 2014

pdp Green Consulting



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4.0 OBSERVATIONS AND COMMENTS.....	4
5.0 CONCLUSIONS AND RECOMMENDATIONS	7

Double Lodges Complex, Trelowarren
VSA November 2014

pdp Green Consulting



1.0 INTRODUCTION

1.1 pdp Green Consulting Limited were engaged by Sir Ferrers Vyvyan to carry out a visual appraisal of the complex.

1.2 Only significant defects which are considered to be relevant for the purposes of this report are mentioned below. It follows therefore that there may be other cracks, repairs blemishes or indeed unconnected defects that may be visible but not mentioned in this report. It should be noted that no commentary on the interior of the lodges is included in this report.

1.3 The inspection of the property was undertaken on the 7th November 2014 by Mr. Mark Gendall of pdp Green Consulting Ltd.

1.4 At the time of the inspection the weather was cold and wet, the preceding weeks had been predominantly dry. The preceding winter was extremely wet with prolonged periods of heavy wind driven rain.

1.5 This report is based on a visual inspection only. No opening up works were undertaken and therefore no guarantee as to the adequacy or inadequacy of structural elements hidden from view can be given.



2.0 BRIEF DESCRIPTION OF THE STRUCTURE

- 2.1 The Double Lodges Complex is the gated entranceway at the south western site boundary of the Trelowarren Estate, forming a junction with the B3293 road to St Keverne.
- 2.2 The Lodges are Grade II Listed and generally comprise rendered single-storey serpentine rubblestone walls supporting octagonal timber roof structures bearing behind masonry parapets. There is a square brick chimney to each lodge, this was thought to have been replaced at the same time as the roof.
- 2.3 The lodges are both a single-room, approximately 6m across (if inscribed by a circle). The external walls are approximately 600mm thick, widening on the wall face containing the chimney.
- 2.4 The octagonal pyramidal roof structure to both lodges along with the roof covering was replaced in the 1980's, the roof structure comprises a single "king post" truss spanning between the external walls, rafters span from the external walls to the ridge behind a masonry parapet. There is a single purlin at the mid-span of the rafters.
- 2.5 The lodges have been disused and boarded up for many years.
- 2.6 There are three extant cut stone granite gate piers, one large free standing main gate post (originally one of a pair) and smaller piers built against the lodges.
- 2.7 There is a low level wall either side of the entrance which curves on plan terminating with a cut stone pier adjacent to the B3293 road on each side of the entrance.

Double Lodges Complex, Trelowarren
VSA November 2014

pdp Green Consulting



3.0 GENERAL COMMENTS

- 3.1 Generally the render to the lodges is in a very poor condition, the underlying masonry substrate appears sound but due to a lack of maintenance (an attributed water ingress) areas of render have failed and fallen away exposing the stone masonry.
- 3.2 The windows and doors of the lodges have been removed and the window openings have been infilled with concrete blockwork. The door openings were boarded over with plywood which was removed to allow the surveys to take place.
- 3.3 The timber roof structure to both lodges was found to be in very poor condition.
- 3.3 The cut stone terminal piers at the far ends of the flanking walls have a pronounced lean towards the B3293, this lean should be investigated to ensure that it is not progressive. This is particularly pertinent due to the proximity of the piers to the road.



4.0 OBSERVATIONS AND COMMENTS

South East Lodge - (External Features Only)

- 4.1 The external elevations of the lodge were found to be free of significant defects. There was some crazing to the render in areas around windows and doors but none was considered to be structurally significant. There were no signs of any crack patterns that could be considered related to structural movement within the bearing strata below the foundations. (Plate 1).
- 4.2 While outside the remit of this report, it was noted there was a crack through the granite lintel to the opening on the southwest wall face. (This wall face contains the external sign). (Plate 2)
- 4.3 To the rear of the lodge (on the opposite face to the entrance door) the mortar to the brick arch had fallen away. The brick arch was in a serviceable condition, there was some mortar loss between the bricks which should be reinstated as part of the repointing works. (Plate 3)
- 4.4 There were no steps or displacement to the granite plinth at the base of the wall which could betray issues with foundation movement. (Plate 4)
- 4.5 Generally we do not consider any of the cracking to the render to be structurally significant. It is likely that the cracks can be attributed to thermally induced stresses within the construction and the use of a brittle cementitious mortar repairs, it should be noted that the original render appears to contain highly granular sand which is perhaps not the most suitable (all mortar and render systems in buildings of this type should be based on lime mortars only). It was noted that the existing cement mortar repairs have incised lines added to match the original.
- 4.6 The cut granite gate pier appeared to be well bonded to the masonry wall of the lodge, it looked plumb and was in as serviceable condition. The shaped granite coping atop the post was well bedded. It was noted that the iron latch was missing.
- 4.7 There was a displaced stone in the top right hand corner of the face of the lodge comprising the entrance door. It was unclear if this stone was displaced during the roof replacement works, it should be reset and repointed. (Plate 5).



North West Lodge - (External Features Only)

- 4.9 Externally, there are few differences in the external design of the two lodges, the North West Lodge being a mirrored version of the South East Lodge. Fundamentally the same issues exist with the North West Lodge.
- 4.10 The brickwork to the arch within the face of the Lodge to the left of the gate post was particularly weathered with areas of significant mortar loss. (Plate 6) It was noted that the faces of the bricks forming the spring to the arch were damaged (possibly due to freeze/thaw action).
- 4.11 There were areas of fallen render at the base of the wall on the face of the Lodge adjacent to the Flanking Wall, it is likely that the failing render issue is progressive. (Plate 7).
- 4.12 The granite gate pier appeared sound and the stones well bedded, it was noted that the embedded wrought iron gate hinge pin was heavily delaminated and showed signs of prying the granite blocks apart.
- 4.13 The roof has covering was damaged and was allowing water to enter the lodge.

Flanking Walls

- 4.14 The flanking walls are constructed from granite ashlar with a bedded granite coping. They are approximately 1.2m high rising to a height of 2.4m at the ends where the walls rise to meet both the lodges and the terminal piers.
- 4.15 The walls follow a curve on plan, at the roadside end of each wall is a square (on plan) granite ashlar terminal pier topped with a square granite capstone.

South East Flanking Wall

- 4.16 The wall was generally in sound condition with no out of plumb areas noted. The lines of the granite plinth did not exhibit any signs of movement that could betray foundation issues.
- 4.17 The coping stones to the wall were being displaced by vegetation growth. (Plate 8).
- 4.18 There was an area of severe mortar loss to the rear of the wall adjacent to the terminal pier. (Plate 9). The coping stone in this area required rebedding. (Plate 10).



North West Flanking Wall

- 4.19 Similar to the South East Wall, it was found generally to be in sound condition with no out of plumb areas noted. The lines of the granite plinth did not exhibit any signs of movement that could betray foundation issues.
- 4.20 At the start of the wall slope up to the terminal pier the wall was displaced into the estate by approximately 30mm, the coping stones were also displaced at this location. (Plate 11) It is unclear as to the cause of this displacement, the plinth below was unaffected.
- 4.21 There were areas of mortar loss to the rear of the wall adjacent to the terminal pier. (Plate 12).

Terminal Piers

- 4.22 Both terminal piers were inherently sound, they were well-built and robust structures and despite the pronounced lean appear to currently be in a stable state of equilibrium. Simply put, unless they continue to rotate outwards it is likely they will continue to remain serviceable in the short to medium term. (Plates 13 & 14).
- 4.23 We recommended that it would be prudent to monitor the displacement of the piers over a 12 month period and then periodically to ensure that the rotation is not progressive. Ongoing root/vegetation growth could over time make the piers unstable, and therefore potentially pose a risk to the users of the public carriageway in the medium to long term.

Isolated Gate Pier

- 4.24 The granite gate pier appeared plumb with no signs of structural issues, the joints were found to be even and no damage to the pier was apparent despite the force of impact required to displace the capstones.
- 4.25 The pair of granite capstones were significantly displaced (due to being struck by a vehicle). (Plates 15 & 16).
- 4.26 The embedded wrought iron gate hinge pins were corroded but showed little sign of causing damage to the gate pier.



5.0 CONCLUSIONS AND RECOMMENDATIONS

- 5.1 It should be noted that none of the issues raised within this report, with regard to the main lodges, are indicative of structurally significant inadequacies.
- 5.2 We recommend that the terminal piers are monitored biannually for a period of 12 months and then annually for 3 years to ensure that the movement is not progressive. Investigation should take place for possible root damage from adjacent mature trees. If necessary the roots should be removed in the vicinity of the pier foundations and a suitable root barrier installed to prevent future damage. The advice of a qualified tree surgeon should be sought prior to any potentially damaging works being carried out.
- 5.3 We recommend that the vegetation is removed from the lodge walls and the pointing to the wall is raked out and repointed in a suitable lime based mortar.
- 5.4 Vegetation should be removed from flanking walls and coping stones removed and re-bedded to their original line and level.
- 5.5 The displacement in the North West flanking wall should be rectified by removing the affected granite blocks and rebedding to the original line. Careful attention to be given to ensuring that the mortar joints match the existing fine bed joints.
- 5.6 In our opinion the structures are structurally adequate and stable for the medium to long term. There was no sign of movement or cracking that could reasonably be attributed to foundation movement or settlement.
- 5.7 The flanking walls appeared sound and if the recommendations above are followed, they should remain serviceable in the medium to long term.
- 5.8 Corroded fixings should be removed and replaced where they are used to hang new gates.
- 5.9 The roofs to the lodges should be replaced.

END

Double Lodges Complex, Trelowarren
VSA November 2014



Plate 1: General view of entrance elevation showing missing sections of render.



Plate 2: Crack to underside of granite lintel.

Double Lodges Complex, Trelowarren
VSA November 2014

pdp Green Consulting



Plate 3: Exposed brickwork to arch, note incised lines in render.



Plate 4: Granite plinth to base of wall, note junction with flanking wall.

Double Lodges Complex, Trelowarren
VSA November 2014

pdp Green Consulting



Plate 5: Displaced stone at parapet level. Note large areas of missing render.



Plate 6: Damage to brick arch and missing render.



Plate 7: Fallen areas of render, note ivy growth at eaves.



Plate 8: Displaced coping stones.

Double Lodges Complex, Trelowarren
VSA November 2014

pdp Green Consulting



Plate 9: Mortar loss to wall adjacent to terminal pier.



Plate 10: Coping stone in need of rebedding.



Plate 11: Displacement to North West Flanking Wall.



Plate 12: Mortar loss to rear face of North West Flanking Wall.

Double Lodges Complex, Trelowarren
VSA November 2014

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Plate 13: South East Wall Terminal Pier (showing lean)



Plate 14: North West Wall Terminal Pier (showing lean)



Plate 15: Granite Gate Pier (Note displaced cap stones)



Plate 16: Extent of displacement of cap stones.

Appendix 3: Design statement

January
2015

Double Lodges Complex, Trelowarren

DESIGN STATEMENT

Proposed External Repairs & Consolidation Works



pdp Green Consulting





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1.0 INTRODUCTION

1.1 Purpose of Document

Since the requirements for a Planning Statement and Design & Access Statement overlap for applications involving Listed Buildings, this single document has been prepared to cover the issues normally covered in these two documents. The Heritage Statement aspect is predominantly covered by the archaeological information prepared by the Cornwall Archaeological Unit (CAU) and submitted as part of this Listed Building Consent application.

This Listed Building Consent application is for the proposed consolidation/repair of the Double Lodges Complex at the Trelowarren Estate, Mawgan, near Helston. This site has been entered into Natural England's Higher Level Stewardship Scheme (Agreement Number AG00360113). The existing lodge buildings and accompanying gate piers and screen walls are Grade II Listed (English Heritage list entry number 1311108).

We trust the accompanying drawings, photographs and documents provide a complete description of the project and allow favourable determination of the application.

1.2 Brief History of the Building

Refer to the 'Historic Building Survey & Assessments Report' prepared by CAU.

1.3 Current & Future Use

The Lodges are currently vacant, and have been so for many years. Future use remains uncertain, but it is envisaged that an appropriate use be found for them as part of future redevelopment works at Trelowarren Estate by Sir Ferrers Vyvyan (the applicant).

1.4 Listing Description

Refer to the 'Historic Building Survey & Assessments Report' prepared by CAU.

1.5 Condition of Buildings

The Lodges are in poor condition, with failing external render exposing the underlying stonework substrate, and with water ingress occurring through the roof finishes. Further detailed information regarding the condition of the relevant elements is presented herein.

The aim of this project is to carry out external enveloping and consolidation repairs in order to secure the future of the buildings and associated gateposts and screen walls.

1.6 Context

The Double Lodges Complex is the gated entranceway at the southwestern site boundary of the Trelowarren Estate, forming a junction with the B3293 road running between Helston and Coverack. The location at the extremity of the estate and has meant that the application site has been subjected to vandalism and theft in the past.



Figure 1. The Double Lodges complex viewed from the B3293 highway, November 2014

1.7 Development of Repair Proposals

The preparation for the significant consolidation/repair work is taking place through Natural England's Higher Level Stewardship Scheme. This has since been developed into a strategic brief for the repair project, and a Design Team has been commissioned to progress the project. The Design Team commenced work in October 2014 and has carried out detailed fabric and dimensional surveys, followed by the production of design proposals for the repairs. This Design Statement is accompanied by copies of the survey documents, and drawings setting out the repair proposals.

2.0 HERITAGE STATEMENT

2.1 History & Character

Refer to the 'Historic Building Survey & Assessments Report' prepared by CAU.

2.2 Contemporary Drawings

Refer to the 'Historic Building Survey & Assessments Report' prepared by CAU.

2.3 Contemporary Photographs

Refer to the 'Historic Building Survey & Assessments Report' prepared by CAU.

2.4 Original Construction – Structure & Fabric

The lodge buildings comprise of rendered single-storey serpentine rubblestone walls supporting octagonal timber roof structures behind parapets. The octagon is an important shape at the Estate, relating to various forms adopted at Trelowarren House. The listing description of the Double Lodge Complex from 1957 describes an original scantle slate finish to the left-hand (NW) lodge, with asbestos slated to the right-hand (SE) lodge, but these roof finishes were replaced during the 1980's using Spanish slate and grey ridge/hip tiles. At that time the roof structures were also replaced, along with the brickwork chimney on each lodge. No window or door joinery remains at the building, and previous window openings have been sealed using concrete blocks, whilst the door openings are boarded over with plywood. Postcards reproduced in Figures 8, 9 & 10 of CAU's 'Historic Building Survey & Assessment Report' show the window styles used at the buildings in early and mid 20th century respectively. The complex is completed by the centralised gateway arrangement (now only partly intact), and a pair of granite ashlar flanking walls terminating at piers at the entrance to the carriageway.

2.5 Survey Work

The Design Team undertook the following survey and assessment work in November and December 2014, in order to gather information about these elements of the building, along with the defects that they are suffering:

- **Assessment of Existing Information**
- **Measured Survey**
- **Pre-Works Photographic Record**
- **Bat Assessment**
- **Condition Survey, including Structural Appraisal**
- **Statement of Significance**

Refer to the 'Historic Building Survey & Assessment Report' prepared by CAU, for further information.

2.6 Recent Alterations & Repairs

Our client (the applicant) has advised that that the roof structures were replaced during the 1980's using a design matching the original configuration, each comprising 8no. principal rafters spanning from the wall corners to ridge, with a central vertical post distributing the load to a horizontal tie. Purlins span between the principal rafters and support common rafters. There is bituminous felt above the rafter line, with slating battens over. It appears that a lead DPC was installed below the parapet coping stone at this time, along with the brickwork chimneys being totally rebuilt (complete with lead tray DPCs in the stack) and the lead gutter linings to each lodge being repaired or replaced; it is possible to see the underside of plywood gutter support boards from inside the buildings. Unfortunately the lead linings to the parapet gutters have since been stolen from both roofs. Along with localised damage to the roof slating, this missing roof finish is a significant contributory factor of water ingress into the buildings.

2.7 Proposed Repairs

The repair design proposals have been prepared with the aim of minimising the extent of repairs carried out, maximising the retention of historic material, and to employ as far as possible original materials, details and construction methods.



Figure 2. Roof structure to the SE Lodge; note extent of water staining & fungal growth to timberwork, November 2014

2.7.1 Repair of Roof Structures

The leadwork parapet gutter linings have been stolen from both roofs, and localised areas of missing slating were observed in the SE Lodge from viewing internally. The integrity of the roof finishes has therefore been compromised and has led to a sustained period of water ingress into the buildings. Furthermore, the vacant buildings have had their window and door openings sealed meaning that there has been a lack of ventilation to assist drying out. Unfortunately, the damp conditions have provided a perfect environment for significant wet and dry rot to develop in the roof structures. If feasible then it is proposed that the roof timbers be repaired and treated for fungal attack. Should this be possible then repairs would consist of:

- Localised replacement of damaged common rafters and wall plates, and
- Localised repairs to damaged timber purlins, principal rafters or truss members, using partnered steels or timbers, or new sections scarfed in.

However, it is more likely that that the timbers are in poor enough condition to be replaced in their entirety, and it is possible that other defects in the roof finishes are present. For example, the apexes of the roofs to both lodges appear to have rot infestations, suggesting water penetration through the ridge or hip tiles. The 'Structural Appraisal Report' advises that the roof structure requires replacement of all rotted timber, subject to a detailed assessment and verification by a Structural Engineer. We understand from our client that the structures are from the 1980's but were replicated according to the original design. Should wholesale replacement of the roof members be required (and for which we must assume this 'worst case scenario' for the purpose of the Listed Building Consent application) then this would be undertaken using treated timbers of matching species, sizes and configuration, being the only evidence of structures that resemble those that were found at the original lodges. Cross ventilation will also be introduced at eaves level using a proprietary ventilator (Nicholson Airtrak), and this incorporates a bug-mesh to prevent insect entry. The ventilator requires a sheet metal covering, and Code 5 lead is considered most appropriate for these buildings. The provision of cross ventilation will assist in drying out the solid wall constructions, along with the roof timbers bearing onto them.

Asides from the clearance of ivy from the chimney to the SE Lodge (item 2.7.7), the existing chimneys are to remain undisturbed during the works as, having been rebuilt during the 1980's, it is anticipated that these are in a stable and robust condition.

2.7.2 Repair of Roof Finishes

The roof slates are approximately 500 x 250mm in size. Our client has advised us that these are of Spanish origin, used together with (assumed) grey clay ridge and hip tiles. It was not possible to inspect the roof finishes from parapet level, but viewing from inside it was evident that localised areas of slating are missing (either slipped, broken or have been removed) and are to be repaired. The slating to the roofs otherwise appeared to be in reasonable condition and is to be retained. However, it may be necessary to strip the roof entirely (in order to complete the roof repairs described in item 2.7.1), which would involve relaying salvaged slates plus matching slates to make up any shortfall.

Evidence of bats was found in the NW Lodge, as presented within the Bat Assessment submitted as part of this application. The recommendation of the assessment is that it will be necessary to maintain access to this building, in the form of a 'letterbox' arrangement with a minimum opening size of 150 x 50mm. This has been proposed in a visually unobtrusive position on the northwest facing roofslope of the NW Lodge. On the basis that it is proposed that the buildings are being consolidated and externally repaired only, we have also proposed the installation of a similar letterbox on the southeast facing roofslope of the SE Lodge, as these openings will assist in providing ventilation and assist drying out within the buildings. In addition, it is necessary to ensure bitumen felt underlay is used in roofs that will potentially be inhabited by bats. This is used at the existing buildings, and this type of membrane is specified should it require replacement.

The Double Lodges Complex is at a vulnerable location on the edge of the Trelowarren Estate site boundary away from nearby settlements or dwellings and therefore lacks security. This siting next to the B3293 highway has historically made it a prime target for vandalism and theft. Whilst proposals to improve the site security are being proposed (item 2.7.5) the roofs of the lodges could remain a target for lead theft. Furthermore, the profile of the existing gutters was not established during the survey inspection but it is extremely likely that the falls, bays and step heights do not align with current Lead Sheet Association 'best practice' guidance. Reprofiling of the gutters would have to be considered should a lead finish be relaid, otherwise the existing gutter profiles would remain a potential source for water ingress, due to inadequate detailing or capillary action. This would also be a costly exercise.

It is therefore proposed that an alternative lining is used for the parapet gutters, and a liquid roof coating system ('Elastaseal' by Tor Coatings) would provide a durable and cost effective solution, being a BBA Certified product with a 25-year installation guarantee. An alternative 'single ply membrane' covering was also considered ('Samafil' and equivalent products), but our experience is that these sheet membranes can fail quite easily (torn or punctured, especially by the beaks of larger birds hunting for seeds) and their repair is not a simple

operation. By comparison, the liquid roof coating system merely requires another application of top coat should a problem occur. The existing plywood gutter boards will not require reprofiling using a liquid coating system, but their prolonged exposure and continual saturation almost certainly indicates that full replacement shall be necessary. Localised stripping of the slates will be required to achieve this, but the entirety of the roofs will require stripping anyway to undertake structural repairs (as previously discussed). Stainless steel leaf-guard gratings are to be fitted over the outlets to assist in preventing blockages (from leaves, vegetation, etc) within the existing discharge pipework exiting the gutter sump.

2.7.3 Repair of the Lodge Elevations

The painted render to the elevations of both lodges is failing, exposing the serpentine rubblestone substrate. This remaining render appears to be original (20-25mm thick), with some areas having receiving a further skim type coat of cementitious render, presumably an early 20th Century repair to prevent further deterioration of the original finish. Incised lining is evident in the remaining render finishes, adopted to imitate horizontal ashlar coursings. It will be necessary to record the size, depth, profile, positioning, etc of these lines prior to removal of the existing render finishes, so that they can be replicated in the replacement render.



Figure 3. NW Lodge showing degradation of the render finishes and underlying stonework, November 2014

The existing render mix appears to consist of an earthen binder and a well rounded, pebbly sand with some fairly large grains, suggesting that this came from the beach at nearby Gunwalloe. Render specifications usually use a sharp well graded sand which encourages it to bind to the substrate. The existing render will be sample tested during the tender phase of the project, so that a suitable and more robust render can be made using a hydraulic lime binder. The concern is that Gunwalloe is inaccessible for extracting sand, and that this sand type may even be inappropriate and a contributory factor in the deterioration of the render finish on the stonework substrate, but this remains to be confirmed by sample testing in due course. In any case, the proposed render will be replaced using a hydraulic lime/sand mix. This will remain unpainted, and the postcards reproduced in Figures 8 & 9 of CAU's 'historic building survey and assessments' report demonstrate that the lodge buildings were not decorated originally, and the incised lining is visually prominent. The existing remaining decorative coating appears to be inappropriate modern masonry paint.

The existing pointing in the rubblestone substrate wall is a friable and earthy mortar. The exposed mortar has been subjected to continual weathering and wetting/drying cycles. Prior to re-rendering, it will be necessary to consolidate/repair the external walls by repointing the joints using a suitable hydraulic lime/sand mix which allows the evaporation of water through the joints between the masonry. The condition of the masonry concealed by the remaining render finishes is unknown, and some areas are likely to be defective. It will also be necessary to locally repair any defective stonework and brickwork arches as they are uncovered, using matching masonry bedded in hydraulic lime/sand. Some of the brickwork repairs will require the use of new bricks and these may need to be specifically made in a small quantity to match the size, shape, colour and texture of the original bricks if a good match cannot be found from commercially available bricks.

Ferrous fixings remaining in the external walls will also be removed, otherwise these will continue to rust, and are a potential cause of damage to the masonry.

2.7.4 Reinstatement of Entrance Doors & Windows

Figure 9 within CAU's 'Historic Building Survey and Assessments' Report' also shows the assumed original windows installed at the Lodges, consisting of paired casements with octagonal shaped single-glazed panes in thin timber glazing bars. This is symbolic of the shape of the lodge buildings but it should be noted that a similar window style is also found at the chapel element of Trelowarren House, as part of the octagonal theme at the Estate. This may well exemplify mid 18th Century developments overseen by the Architect Thomas Edwards.

It is proposed that 2no. window openings in the front (SW facing) and rear elevations (NE facing) are reinstated with new hardwood windows, replicating the original windows. It is unclear if the original windows could be opened, but the photograph certainly suggests that each window comprised a pair of side opening casements and closing onto a central mullion. It is proposed that the new windows can in order to ventilate the buildings. This would also encourage their adaptive re-use in the future, providing the basis of a more useable space, that otherwise couldn't be achieved using fixed windows. The original timberwork in the windows shown in the historic photograph appear to be quite dark and suggesting that these were not painted, It is the intention that these windows are left unpainted and regularly maintained using a linseed oil finish.

There is no historic evidence to indicate the original timber door design but it is proposed that the replacement doors are panelled rather than ledged and braced, which seems more appropriate with the design and status of the lodge buildings. The style and appearance had been agreed with our Client to be in keeping with other doors found at the estate. The new treated softwood doors are to receive a paint finish.

2.7.5 Reinstatement & Repairs to the Entrance Gateway

Figures 8 & 9 of CAU's 'Historic Building Survey and Assessments Report' also shows the original arrangement of the gateway to the Estate, which the lodge buildings flanking either side. These gateposts are of a granite/elvan construction, with individual stones having chamfered edges. It is possible to see that the configuration was for a paired central gate positioned between the pair of large gate posts, and 2no. single pedestrian gates between each of the small and large posts. Originally, the main gateway is likely to have been designed to allow for the passing of a horse and carriage. The postcard from c1910 in Figure 9 of CAU's report shows that the main gate leafs are formed from top and bottom horizontal wrought iron members containing a simple set of vertical rails, and curved diagonal bracing.



Figure 4. Displaced capping to remaining main gatepost, with corroding 'pintail' hinge and former lantern support remaining, November 2014. It is important to note that the gatepost capping has been hit and displaced further since this photo was taken.

The gatepost finials, wrought iron gates and the northernmost large gatepost are no longer present at the Double Lodges complex (Figure 1). The gatepost stonework

remains in a heap under vegetation next to the NW Lodge, with the exception being the finials that have been altogether lost or stolen. It is assumed this gatepost was historically dismantled to allow an adequate width for large vehicles such as tractors to access the active farms that still remain in the estate grounds, or the gatepost suffered from a damaging impact. Furthermore, the capping on the remaining large gatepost has been dislodged (Figure 4), hit on more than one occasion by high-sided vehicles. The only evidence remaining of historic gate ironwork are the 'pintail' elements of the hinges still located in the small and large southernmost gateposts, along with an iron bar on the large remaining gatepost that would have once held a lantern over the south-east pedestrian gate. The iron bar is now broken, twisted and corroding, whilst the hinges are also corroding; in one case rust expansion has opened the ashlar joint and forced the stonework upwards.

It is proposed that Double Lodges becomes the main entrance for the Estate, and this will be critical from a safety viewpoint. The internal estate driveways are all single track, making a 'one way' system essential. These tracks are used by approximately 15,000 day-visitors per year. At present the main entrance is located at the gate of Tresemper Lodge (on the Newtown road closer to Garras village), whilst the Double Lodges Complex is used as the main exit from the estate.

Cornwall Council's Highway's Department has highlighted the exit from Double Lodges onto the very fast B3293 highway as being dangerous, following several significant accidents. Improvements to the junction are impractical, given the very wide visibility splays that would be required to make it safe and the restrictions imposed by the historically significant wall and pier structures that flank either side of the lodge buildings. Formation of a separate entrance is also deemed impractical and uneconomical, as it would require puncturing the well-established site boundaries, forming new access roads on the estate (destroying existing woodland and fields), whilst undermining the historical significance of the established gateways. For these reasons it is proposed that the existing traffic route will be 'flipped' so that all estate traffic enters via Double Lodges and exits via Tresemper Lodge.

With the Double Lodges complex now being proposed as the main entrance, this has presented further challenges to overcome. The appearance of the buildings and structures will be the first impression that visitors have on arrival, and the repairs proposed as part of this application are essential in improving the overall appearance, whilst reinstatement of the gates will improve site security and formalise the entranceway. Ideally the reinstatement of the missing gatepost to its original position would allow the symmetry of the entrance to be restored. However, a perfectly symmetrical reinstatement would create a very narrow opening passable only by car, and large farm vehicles for which this is the only access would not be able to get through. The necessity for a wider entranceway, suitable for high-sided vehicles

such as coaches and tractors, cannot be avoided. For this reason the following options have been considered:

- **The reinstatement of the missing gatepost in its original position.** This would mean that a new entrance for large vehicle access would have to be created elsewhere. This is a wholly impractical solution, with reasons presented above.
- **The reinstatement of the missing gatepost in a position closer to the NW Lodge and the dismantling/rebuilding of the remaining gatepost closer to the SE Lodge.** This would widen the opening and reinstate a symmetrical configuration. However, this proposal is considered poor conservation practice as it involves dismantling the perfectly robust gatepost structure, for which there is inadequate justification.
- **Repairing the existing gate pier but not reinstating the missing gatepost.** The existing gatepost would remain covered in a heap of vegetation close to the site. The existing posts would be relied upon to hang new iron gates, and it is unlikely that these posts would be adequate for this size of entrance opening, with an alternative for leaving the gates off would do little to improve the appearance as the formal main entrance to the estate.
- **The reinstatement of the missing gatepost in a position much closer to the NW Lodge.** This will create an asymmetrical arrangement, admittedly not a perfect solution. However, it allows for the gatepost to be reinstated using salvaged stonework bedded and pointed in hydraulic lime/sand mortar, and provides adequate support for new painted steel gates (more robust and cost effective than wrought iron) as part of a formal entranceway. **This option is therefore considered the most appropriate solution.** As part of the works the displaced capping to the remaining gatepost will be reset back to its original position. The main entranceway will be wider, so the appearance of the new painted steel gates will take influence from the original design rather than being a true replication, and there will be a necessity to infill between the northernmost gateposts (position of former pedestrian gate) with a set of painted steel railings. It is likely that the gates will need to be hung using new steel 'pintail' hinges, but the existing ironwork will be repaired if this is feasible (i.e. rust inhibiting and redecoration). The distorted/damaged iron bar found on the existing remaining gatepost is to be removed, this being a redundant lantern holder.

2.7.6 Reinstatement of Railings

Figures 8 & 9 above shows that each lodge used to have a set of iron railings aligning the junction between the grass verge and carriageway. It is proposed that railings are reinstated using painted steel railings (1.1m high) that have been installed elsewhere on the estate and have a matching appearance of the original design, comprising 40x10mm flat steel posts at 1,000mm centres, a 20mm diameter top rail and 4 x 18mm diameter lower rails with graduated spacing (closer at the base).

2.7.7 Repair of Screen Walls, End Piers & General Clearance of Invasive Vegetation

The existing screen walls and terminating piers have been assessed, and the findings are contained within the 'Structural Appraisal Report'.

Whilst the piers are at a notable lean, it is advised that these are well-built and robust structures and appear to currently be in a stable state of equilibrium. There are also areas of the screen wall and copings, which have become displaced. Both defects are likely to have arisen from the invasive nature of vegetation growth that has developed behind the screen walls above and below ground. Ivy and other invasive species have even made their way into the external enveloping of the lodges themselves, and the chimney on the roof of the SE Lodge is now completely concealed from view. Root growth can cause serious damage and loss of the original structure and fabric from historically significant buildings and structures. It is also important to note that the wall piers are adjacent to the highway, and whilst stable for the shorter-term, ongoing vegetation growth could make the structures unstable, and therefore pose a risk to the public carriageway in the medium to long term.

The following repair works are therefore proposed:

- Clear all invasive vegetation, ensuring a systematic killer is used at their roots to prevent their return. Completely remove all visible growth from the lodge buildings, screen walls and piers and ensure periodic gardening maintenance is undertaken to prevent overgrowth in the future.
- Remove underground root growth from beneath the wall piers. A Structural Engineer should investigate existing footings at the base of the piers whilst these are exposed.
- Localised repairs to screen walls is to be undertaken, including rebedding of displaced coping stones in hydraulic lime mortar and localised repointing of the ashlar stonework walls.

2.8 Impact of the Proposed Repairs on the Character & Appearance of the Listed Building

2.8.1 Repairs to the Fabric

The exterior fabric of the building suffers from significant defects to the roof structure and finish, and rendered stonework walls, whilst measures are being put forward to make this a more secure site. The proposals for external repairs and consolidation will put the exterior of the building into good condition and safeguard its future for the coming years. All repairs are to be carried out using like for like materials and techniques in most circumstances, with some minor modifications made in some areas to improve the durability of the original design and construction details, as described herein.

2.8.2 Impact on the Character & Appearance of the Building

The majority of the repairs will have a beneficial impact on the character and appearance of the building, as they will make good using the original materials and details the damage that has occurred in the 250 years since the building was constructed, and remove some of the unsympathetic interventions that have taken place.

To conclude, the character and appearance of the building will not be harmed by the repairs and alterations proposed. In fact, the majority of the repairs and alterations will have a beneficial impact on the character and appearance of the building, either returning it to its original appearance and construction or improving the poor performance of parts of its fabric, and the remainder will have a benign effect.

2.8.3 Impact on the Setting of the Building

The project does not involve any extension to the building, or any development of the landscaped areas surrounding the building. Consequently, there will be no impact on the setting of the building.

2.9 Archaeology

2.9.1 Impact on Archaeological Remains

The project involves no excavation work, and consequently there will be no impact on archaeological remains below ground. The building was constructed as a new build in the mid 18th Century and did not incorporate the remains of any earlier structures. There will be no archaeological remains of older structures to be found in the fabric of the building. It is important to note that Trelowarren Estate has carried out lots of investigative work at the estate as a whole, although no excavations have taken place. Consequently, no archaeological excavations have been carried out on the site.

2.10 Planning Policy

2.10.1 National Planning Policy Framework

Section 12 of the NPPF – ‘Conserving and enhancing the historic environment’ covers the national policy with regards to historic assets. Although the NPPF now supersedes PPS5, English Heritage policy regards the PPS5 Practice Guide as remaining a valid and Government endorsed document. The PPS5 Practice Guide is a far more substantial document that presents ‘best practice’ conservation guidance in terms of planning policy, and is therefore fully supportive to the NPPF policies. This Heritage Statement fulfils the requirements set out in the NPPF as follows:

- Paragraph 126: Sustaining and enhancing the significance of the heritage asset and putting it into a viable use consistent with its conservation.
- Paragraph 128: Description of significance of heritage asset affected.
- Paragraph 129: Assessment of the impact of the proposal.

2.10.2 Summary

It very much remains the case that national planning policy sets out a presumption in favour of the conservation of designated heritage assets. The project complies with this presumption and where alterations are proposed, these will have no detrimental impact on the character, appearance or setting of the building, but will enhance its performance with regard to sustainability and durability.

3.0 PLANNING STATEMENT

3.1 Amount of Development

In the case of this proposal, there is no new development to consider.

3.2 Layout of Development

Since there will be no new development, the layout of the present site and building remains unaltered. No internal works to change the layout are proposed.

3.3 Scale

The existing building has considerable scale, and the proposed alterations have no impact on it.

3.4 Appearance

The appearance of the building will remain unchanged, in the sense that no external additions are proposed. In fact, the repair of the external fabric will improve the appearance of the building.

3.5 Landscaping

No works are proposed to the site around the building, and consequently there will be no impact on the formal, mature landscape that presently surrounds the building.

4.0 ACCESS STATEMENT

4.1 Access to the Development

No changes regarding disabled access to the site or building are proposed as part of this application.

END

Appendix 4: Mortar Analysis Reports

Peter Ellis

Historic Buildings Consultancy
Materials, Method and Mortar Analysis

Mortar Analysis

Test Report No. 4252.

Double Lodges Complex, Trelowarren Estate.

Sample 1. Boundary Wall mortar.

One sample of bedding and pointing mortar, (weight 32.7g), taken from an existing ashlar granite-built 'screen' boundary wall at the former main entranceway to the Estate has been analysed chemically and microscopically.

Sample Assessment, Preliminary Tests and Observations:

Dry sample. Generally un-carbonated (phenolphthalein carbonation test). Discrete hard (some fragments could be snapped by hand with difficulty but not crumbled in fingers; crushed with some difficulty using pestle) fine cream-white mortar pieces. Apparent water permeability moderate/low. Aggregate principally fine quartz. Fuel ash particles not seen. Calcareous aggregate not observed. Hair/fibre reinforcement not present.

Reaction Comments:

Moderate effervescence on addition of dilute hydrochloric acid.

Chemical 'Dissolution' Analysis (% dry mass) to BS4551:2005.

%	Initial Moisture (oven @ 100°C)	2.93
%	Total Calcium as CaO (titrimetric method)	39.67
%	Total Magnesium as MgO (titrimetric method)	0.14
%	Acid & alkali soluble Silicon as SiO ₂ (gravimetric method)	6.01
%	Total (acid-soluble) sulphate as SO ₃ (gravimetric method)	1.23
%	Soluble Aluminium as Al ₂ O ₃ (ICP-OES method)	2.88
%	Soluble Iron as Fe ₂ O ₃ (ICP-OES method)	1.20
%	Total Acid Insolubles	15.7

BINDER

The binder in this sample is un-carbonated lime. Moderate/eminent hydraulicity of lime binder is indicated by CaO: soluble SiO₂ ratio. The sulphate result confirms that gypsum was not a deliberate original mix ingredient.

AGGREGATE

Insoluble particle size range: 750µm to 150µm (76.84%) : <150µm (23.16%)

The insoluble residue comprises principally:

Colourless Quartz

Mica, feldspar, tourmaline and particles of various igneous mineral types

Grey/brown clay fines

(cont.)

TEST REPORT 4252 (page 2)

MORTAR BY VOLUME

Acid-soluble calcareous sand/aggregate particles (limestone, chalk, shell) were not observed to be present and no allowance has therefore been made. The results after allowance for typical bulk density indicate a calculated volumetric mix of **approximately:**

1 part Lime
0.5 parts Combined Aggregate.

SUGGESTED MATCHING MIX

This is not a specification for a repair mortar, nor must it be treated as one.

The purpose of mortar analysis is to inform the design team. It is outside of the analyst's role to decide on what basis the repair mortar should be specified. This approximate volumetric matching mix recipe is intended to be helpful if the design team consider a 'like-for-like' approach is appropriate for this project. It does not imply that we recommend a 'like-for-like' repair mortar mix design in this particular situation, as there are many relevant factors in addition to mortar analysis that must be taken into account.

1 part Natural Hydraulic Lime* NHL3.5/NHL5
1.5 to 2 parts Cream Quartz sand <0.75mm

***Note:** The grade of Natural Hydraulic Lime should be selected according to the site conditions with special reference to the site exposure.

SOURCES OF MATERIALS

All limes and many sands, stonedusts and aggregates are available from **Rose of Jericho.**

NOTES:

1. Sample mixes must always be prepared to ensure suitability and an accurate colour and texture match.
2. Aggregates with a particle size and grading appropriate for the intended use must be selected. Sands conforming to the relevant British/European Standard should be used especially with **hydraulic** limes.
3. The repair mortar should be no weaker than 1: 2. Manufacturers advice should be sought and recommended application mix proportions and 'Best Practice' guides must be complied with.
4. It should be remembered that mortars change over time. When analysing an aged material, one is ascertaining what it now is and looking for evidence for what it originally was. Calcium hydroxide carbonates to form calcium carbonate, and calcium silicate hydrate (C-S-H), the principal reaction product in hydraulic limes and pozzolanic limes itself reacts over time with carbonic acid to produce calcium carbonate and hydrous siliceous, aluminate and silico-aluminate gels.

13.05.2015

Peter Ellis

Historic Buildings Consultancy
Materials, Method and Mortar Analysis

Mortar Analysis

Test Report No. 4253.

Double Lodges Complex, Trelowarren Estate.

Sample 2. Gatepost pointing.

One sample of pointing mortar, (weight 28.6g), taken from an existing granite-built gatepost to the former main entranceway has been analysed chemically and microscopically.

Sample Assessment, Preliminary Tests and Observations:

Dry sample. Fully carbonated (phenolphthalein carbonation test). Discrete soft (small fragments could be broken by hand and partially crumbled in fingers; disrupted with ease using pestle) cream-white mortar pieces and powder. Apparent water permeability high. Well-mixed. Aggregate principally quartz and igneous minerals. Fuel ash particles not seen. Calcareous aggregate not observed. Hair/fibre reinforcement not present.

Reaction Comments:

Moderate effervescence on addition of dilute hydrochloric acid.

Chemical 'Dissolution' Analysis (% dry mass) to BS4551:2005.

%	Initial Moisture (oven @ 100°C)	1.21
%	Total Calcium as CaO (titrimetric method)	6.08
%	Total Magnesium as MgO (titrimetric method)	0.20
%	Acid & alkali soluble Silicon as SiO ₂ (gravimetric method)	0.99
%	Total (acid-soluble) sulphate as SO ₃ (gravimetric method)	0.49
%	Soluble Aluminium as Al ₂ O ₃ (ICP-OES method)	0.66
%	Soluble Iron as Fe ₂ O ₃ (ICP-OES method)	0.07
%	Total Acid Insolubles	84.2

BINDER

The binder in this sample is carbonated lime. Weak hydraulicity of lime binder is indicated by CaO: soluble SiO₂ ratio. The sulphate result confirms that gypsum was not a deliberate original mix ingredient.

AGGREGATE

Insoluble particle size range: 4.10mm to 150µm (78.38%) : <150µm (21.62%)

The insoluble residue comprises principally:

Colourless Quartz

Mica, feldspar and particles of various igneous mineral types

White clay (kaolin)

(cont.)

TEST REPORT 4253 (page 2)

MORTAR BY VOLUME

Acid-soluble calcareous sand/aggregate particles (limestone, chalk, shell) were not observed to be present and no allowance has therefore been made. The results after allowance for typical bulk density indicate a calculated volumetric mix of **approximately:**

1 part Lime
3.5 to 4 parts Combined Aggregate.

SUGGESTED MATCHING MIX

This is not a specification for a repair mortar, nor must it be treated as one.

The purpose of mortar analysis is to inform the design team. It is outside of the analyst's role to decide on what basis the repair mortar should be specified. This approximate volumetric matching mix recipe is intended to be helpful if the design team consider a 'like-for-like' approach is appropriate for this project. It does not imply that we recommend a 'like-for-like' repair mortar mix design in this particular situation, as there are many relevant factors in addition to mortar analysis that must be taken into account.

1 part Natural Hydraulic Lime*
2.5 parts Cream Quartz sand <4.10mm

***Note:** The grade of Natural Hydraulic Lime should be selected according to the site conditions with special reference to the site exposure. The sample binder is equivalent to NHL2 but there may be good reason to consider the use of a more hydraulic grade.

SOURCES OF MATERIALS

All limes and many sands, stonedusts and aggregates are available from **Rose of Jericho.**

NOTES:

1. Sample mixes must always be prepared to ensure suitability and an accurate colour and texture match.
2. Aggregates with a particle size and grading appropriate for the intended use must be selected. Sands conforming to the relevant British/European Standard should be used especially with **hydraulic** limes.
3. The repair mortar should be no weaker than 1: 2½. Manufacturers advice should be sought and recommended application mix proportions and 'Best Practice' guides must be complied with.
4. It should be remembered that mortars change over time. When analysing an aged material, one is ascertaining what it now is and looking for evidence for what it originally was. Calcium hydroxide carbonates to form calcium carbonate, and calcium silicate hydrate (C-S-H), the principal reaction product in hydraulic limes and pozzolanic limes itself reacts over time with carbonic acid to produce calcium carbonate and hydrous siliceous, aluminate and silico-aluminate gels.

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